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JOURNEYS THROUGH KAM (EASTERN TIBET)

Eric Teichman, C.I.E., B.A.

Read at the Meeting of the Society 6 June 1921. Map following p. 80.

Spelling of names is Tibetan, with alternative Chinese in brackets where necessary.

THAT part of Eastern Tibet dealt with in these notes, that is to say, roughly speaking, the basins of the Salween, Mekong, Yangtze, and Yalung rivers between the latitudes of Jyekundo and Atuntze, consists of the eastern portion of the great Tibetan plateau, here furrowed by the canyons of the above rivers and their affluents. These streams flow, in the northern part, through broad open grassy valleys (ice-formed), and in the southern part through deep narrow gorges (water-eroded). The general trend of the drainage being south and south-east, the roads, easiest in the north, become more and more difficult as one proceeds south; whence arises the great contrast between the two highways and their subsidiary branch roads, from Szechwan to Tibet—the north road from Tachienlu to Jyekundo, and the south road from Tachienlu *viâ* Batang to Chamdo. On the former, which might without great difficulty be made passable for cart traffic, one keeps at a comparatively high elevation all the way, and, although the passes are big, the gradients are not very steep; while on the latter one is constantly climbing in and out of deep narrow valleys, which bring one down to 8000 or 9000 feet, and scaling steep and difficult passes up to 15,000 and 16,000 feet.

Following down the headwaters of one of the big rivers, say the Mekong, from the north, cultivation begins generally at from 12,000 to 13,000 feet; the usual limit for barley being about 13,500 feet (except on certain favoured slopes), and for wheat 11,000 to 12,000 feet. Trees run up to 14,500 feet at least; but the big forests, of which there are many, are usually confined to the mountain slopes facing north; the same peculiarity being noticeable over a vast stretch of North-Eastern Asia from Shensi and Kansu across the Kokonor border into Tibet.

The wettest seasons of the year are the summer and autumn, which are followed by a period of extreme dryness (November, December, and January), when practically no snow falls at all, and hot days with a bright

sun shining out of a cloudless blue sky alternate with clear frosty nights. (These observations apply more particularly to the neighbourhood of Chamdo, *i.e.* the centre of Eastern Tibet.) As a result the snow-line is apt to be lower in the summer than in the winter; and we have crossed 17,000-foot passes which were practically free of snow in midwinter, and waded through drifts of newly fallen snow at 14,000 and 15,000 feet in midsummer. In South-Eastern Tibet, on the borders of Yunnan, Burma, and Assam, where the precipitation is probably greater, the line of perpetual snow appears to be considerably lower than in the dryer regions further north, thus giving the impression that the mountains are higher. In the spring another snowy season sets in, and as the weather is then still very cold, and the pasturage at its worst, this is the most difficult time of the year for travel. Generally speaking, however, one can cross almost any pass at any time of the year, though they may become blocked with snow for a few days at a time. The true line of perpetual snow in the neighbourhood of Chamdo is probably not far short of 18,000 feet.

The winter cold on the plateau country and on the high passes, though not often falling much below zero Fahrenheit, is rather severe, especially when a wind blows, and is felt all the more as one is there dependent on yak-dung for fuel. In the "Rong" (agricultural valley) country, on the other hand, the winter climate is perfect, while wood for fuel is also abundant.

Locally bred mules are by far the best animals for transport purposes (the mules of Szechwan and Yunnan being of a different breed and quite unable to stand the hardships of life in real Tibetan country for any length of time). The local pony is serviceable for riding purposes, but will always collapse before the mule when the pasturage gives out. Yak are very surefooted and strong, but are unsuited for long journeys except at a phenomenally slow rate of march; but they can usefully be hired from the nomads for a few days' march at a time in order to rest the mules when crossing grass country in the winter or spring, as is often done by the big Lhasa caravans. Yak do not and cannot eat grain; Tibetan mules and ponies will eat almost anything that is available, including tsamba, butter, and even meat at a pinch.

All this region from the Yalung to the Salween is known to the Tibetans as Kam, which, like Amdo in the north-east, is only a vague geographical term without any very definite significance. The Kamba-wa (natives of Kam) are considered rather a wild and barbarous race by the more highly civilized Tibetans of Central Tibet, and the swashbuckler from Kam is a familiar figure in Tibetan theatricals; yet the people of De-ge, for instance, are widely known for their skill in handicraft and their literary attainments. Probably the Kamba-wa owes his reputation for turbulence to his distance from the metropolis, which renders him uncouth in manner to the inhabitants of the latter. The real wild men of Tibet are the nomads of the north-east; while everywhere the house-

dwellers in the agricultural valleys (of which Kam has more than its share) are much more civilized than the tent-dwellers of the grass country.

The secret of successful and agreeable travel in Eastern Tibet is to depend as much as possible on the natives, the native animals, and the native products of the country. In a region where milk, butter, mutton, beef, barley, wheat, and game abounds, no tinned stores of any kind are needed; and the Chinese or other non-Tibetan element in one's caravan, both as regards animals or men, should be eliminated or reduced to a minimum. Fate has placed Szechwan, with its heavily manured and fertile lowlands and teeming millions of rice-eating inhabitants, next door to the bleak uplands of Eastern Tibet, inhabited by one of the hardiest races in the world; and, though the Chinese have of course a wonderful gift of adapting themselves to their surroundings, it is too much to expect that a Szechwanese should be able to adapt himself successfully to Tibetan conditions. The Kansu Mohammedans, on the other hand, who come into contact with the Tibetans further north in the Kokonor territory, are a hardy and virile race, and are much more at home in Tibetan country.

Eastern Tibet is so universally mountainous, and the troughs of the rivers, in which one is so often travelling, are so deep and narrow, that it is very difficult to describe the trend of the chief ranges; and the following observations on the subject are therefore of a somewhat tentative nature.

The Yü Chu (the river running south from the direction of Chamdo between the Mekong and the Salween) flows between two well-marked ranges with high rocky peaks rising in places far above the line of perpetual snow. These ranges appear to start from the high plateau, which, giving rise to the Yü Chu, lies between Chamdo on the Mekong and Shiyizamka (Chiayüchiao) on the Salween. The eastern one probably runs right down to the huge snow massif which lies west of Atuntze (we only followed it down to the latitude of Tsakalo (Yenching)).

Another very prominent mountain feature in Kam is the big range which runs parallel to, and on the right-hand side of, the main road from Jyekundo to Tachienlu. It is a huge and imposing barrier wherever seen. South of Jyekundo it forms the divide between the basins of the Yangtze and of the headwater streams of the Mekong, and is here crossed by the Shung La, a high pass on one of the roads from Jyekundo to Chamdo. Proceeding south-east it is pierced by the gorges of the Yangtze below Chunkor Gomba (Tengko), and thence serves as the Yangtze–Yalung divide down to below Kantze. On this stretch of its course it contains some very high peaks and glaciers behind Dzogchen Gomba, below which it is crossed by the Tro La on the main road to De-ge. Further down it appears as the magnificent snow-capped range which stretches along the southern side of the Yalung plain from Rongbatsa to below Kanze; in this neighbourhood it is crossed by the Tsengu La and the Hön La on the road to Beyü and Southern De-ge, and by another high pass on a road to Nyarong. Below Kanze it is pierced by the gorges

of the Yalung, which are overlooked by a giant snow-peak, Kawalori, a sacred mountain of Nyarong. From here it continues south-east to Tachienlu, where it serves as a clear-cut ethnographical boundary between Chinese and Tibetan inhabited country; it is here split into two by the valley of the river of Tachienlu, which is overlooked by snows on both sides. From Tachienlu it continues south, containing here some very big peaks, towards the Yunnan border. I suspect this great range to be a south-easterly continuation of the Dang La mountains north of Lhasa, and to be therefore one of the principal features of the mountain system of Tibet.

There are some very high mountains on both sides of the Yangtze between De-ge Gonchen and Batang, including the giants immediately east of the latter; but I have not been able to distinguish the continuity of particular ranges in that neighbourhood.

It is to be hoped that the heights of the principal mountains of Kam will some day be ascertained by scientific measurement, the results of which will probably show the existence of some very high peaks. I believe that amongst the highest will prove to be the group of peaks behind Dzogchen Gomba (bearing roughly north from the Mizo La near Beyü); Kawalori on the Yalung below Kanze; some of the peaks on the Mekong–Salween divide between Chamdo and the latitude of Atuntze; the peaks east of Batang; and the peaks north and south of Tachienlu.

As regards big game in Eastern Tibet, the antelope (Tibetan go-wa, Chinese chitze) is constantly met with in the grass country. Burhel (wild sheep, na in Tibetan) and goral (wild goat) are very common in the mountains. There are at least two kinds of stag, one with spreading wapiti-like antlers found in the grass country, and another with single antlers with one brow tine found in the forests. On the grass lands round Jyekundo (which are really a portion of the Jang Tang, or northern plateau, of Tibet) we saw large herds of wild asses (chyong in Tibetan, yeh lotze in Chinese), and wild yak and long-horned antelope are found in the same country a little further north. The serow and the takin are not true Tibetan animals, and are found rather in the region of steep forest-clad mountains intervening between Szechwan and the Tibetan plateau. The above list might be greatly extended (bears, leopards, snow-leopards, etc.), but I mention only the animals with which we came into contact (which did not include Abbé Huc's unicorn). In Tzachuka (grass lands of the upper Yalung basin) and in the grass country about Jyekundo and Chamdo we found big game of all kinds remarkably tame and easily approached; this is because the big monasteries in those neighbourhoods do not permit shooting or hunting of any kind in their vicinities.

Of small game the common pheasant is confined to the border country between Szechwan and Tibet, as also are the gorgeous long-tailed varieties. Once in Tibet Proper one can get nothing but the huge white pheasant (very common and easily shot, but an indifferent table bird), a small

CAMP ON THE HLATO PLATEAU (14,000 FEET), GONJO GRASS COUNTRY

ON THE MAIN BATANG-CHAMDO ROAD, A FEW MILES SOUTH OF DRAYA-JYAMDUN

THE PRINTING ESTABLISHMENT IN THE MONASTERY AT DE-GE GONCHEN

SUNRISE ON THE SALWEEN-YÜ CHU DIVIDE, TSAWARONG

GORGES OF THE MEKONG, THREE MARCHES BELOW CHAMDO, ON CHAMDO-YUNNAN ROAD

partridge, and a kind of pheasant-partridge with a square tail (the latter at very high altitudes, perhaps a blood pheasant).

The following are some brief notes on the various routes which go to make up the attached map of Eastern Tibet :

(1) From Kanze *viâ* the Yalung valley to Dzogchen Gomba, and thence *viâ* Seshü and Tzachuka to Jyekundo.

The main road from Kanze to Dzogchen and Jyekundo, followed by Krishna, Rockhill, and other travellers, crosses the Yalung above Kanze and proceeds directly north-west *viâ* Rongbatsa and the Muri La. The road we took follows up the banks of the Yalung, which issues from a gorge in the mountains on to the Rongbatsa–Kanze plain about opposite the big monastery of Darjye Gomba.

We marched up the Yalung for about a week. It is here a swift dark green stream, flowing through alternate gorges and stretches of cultivated valley, at an average height of 11,000 to 12,000 feet. On either side lies the grass country, extending northwards for hundreds of miles to the distant Kansu border. The valley, forming a succession of cultivated oases in a desert of grass country, is thickly dotted with monasteries which serve as religious centres for the surrounding nomads. One of these monasteries, Denchin Gomba, is considered the most important establishment of the Bon sect in Eastern Tibet. This Bon sect is generally understood to be a relic of the old nature worship of Eastern Asia, whose followers in Tibet compromised with the invading Buddhism by adopting the gods and saints under different names and much of the lamaistic ritual reversed, *e.g.* turning wheels and circumambulating holy places in the reverse direction.

Several old Tibetan forts, the seats of small local officials, are passed on the way, such as Deji Podrang, Trötsang Podrang, Dema Podrang, and others. A "Podrang" in Eastern Tibet means a residence belonging to a chief, and occupied by him, or more usually by a district officer appointed by him. They correspond more or less to the "Dzong" of Central Tibet, where the word Podrang seems to be confined to the Dalai Lama's palace, *e.g.* Potala Podrang. They are always of the same architecture, a rough square several stories in height, with an open court in the middle.

At Denchin Gomba the Yalung is joined by an important tributary from the north, the Di Chu, up which lies the main road into the country of the independent Ngolo nomads. The valley of the Yalung above Kanze may be said to be the northern boundary of the settled and more or less civilized parts of Kam, and beyond it lie the unknown pasture lands of these Ngolo and other nomads, which extend from here across the Yellow River basin to the Kansu border. The Ngolo are noted for their horsemanship, their shaven heads, and their predatory habits. Apart from some large monasteries, mostly of the Red Sect, there are no settled habitations in their country, which is nowadays about the least-known region in Central Asia.

The Yalung valley from Deji Podrang up to Nando is known as Tzako, and above Nando as Tzachuka. These names mean, roughly, "basin of the Tza," the Yalung being known as the Tza Chu above Kanze, and the Nya Chu below; whence the name Nyarong (Chantui in Chinese) for the region along the river between Kanze and Nyachuka (Hokou).

At the hamlet of Nando (12,500 feet) we left the Yalung, and turned up the valley of a tributary stream which led us after a short march right up to the great monastery of Dzogchen. Our destination being Seshü in Tzachuka, we might have continued up the Yalung; but finding myself—unexpectedly according to the map—so close to Dzogchen, I proceeded there in order to connect my route survey with a well-known point.

Dzogchen is a cold, bleak spot, about 13,000 feet high, lying right under the snows and glaciers of the Yalung-Yangtze divide. We had here rejoined the main road to Jyekundo, which we followed for four marches, past Göze (Lintsung), a large Sajya monastery and seat of the Göze chief (who is a jyelbo, or king, though his territory is small), to a point on the Yangtze known to the Tibetans as Dröma Hlakang (the name of a famous temple there), and to the Chinese as Tengko. A cultivated plain (11,000 feet odd) here stretches along the Yangtze, on the opposite bank of which lies a large monastery called Chunkor Gomba.

From here the main road to Jyekundo continued up the Yangtze, crossing the river at Drenda Ferry a little further up. We turned north into the mountains, and crossing a high pass in the Yangtze–Yalung divide (Dzi La, 15,800 feet) found ourselves on an undulating grass plateau, a region of flat open valleys 14,000 to 15,000 feet high, sloping almost imperceptibly down towards the Yalung. Another three days' march across these grasslands brought us to Seshü Gomba, a very important Sajya monastery lying at an elevation of over 13,000 feet in a perfectly flat plain a few miles from the Yalung; the latter being here joined by a river from the north called the Marmu Chu (marked on the latest map of Tibet). Seshü (Shihchu) is also the name of the district, which forms the northernmost part of De-ge State. The population is purely nomadic, and from here one could travel north to Sining or Taochow and never see a house.

This road through Tzachuka *viâ* Seshü Gomba is much used by the trading caravans going in and out of Tibet in the summer in preference to the main road along the Yangtze, as by it they can secure good grazing and avoid the agricultural valleys all the way from Jyekundo to near Kanze.

Leaving Seshü Gomba and turning our backs on the Yalung, we travelled for two days in a westerly direction up one of the flat grassy valleys to reach an easy pass, the De-ge–Jyekundo boundary, whence we descended steeply into a ravine and so on down to the Yangtze; the latter is here, at low water, a clear blue stream, flowing in alternate rapids

and deep still pools at an elevation of about 11,700 feet. After crossing in skin coracles and marching up the river for a few miles, we turned up into the mountains at a small monastery called Gala Gomba, crossed a pass, and descended south-west to Jyekundo.

Jyekundo (Chinese Chiehku) is a straggling mud village lying in a small cultivated plain formed by the junction of two streams which combine to form a river flowing east to join the Yangtze. (The termination "do" always denotes a place so situated—as, for instance, Jyekundo, Chamdo, Dartsendo, etc.) The large Sajya monastery of Jyeku Gomba is built on the hillside overlooking the village. In spite of its mean appearance, due to its being a nomad rather than an agricultural centre, Jyekundo is perhaps the most important trade mart in Kam, lying as it does at the junction of the two great trade routes from Sining in Kansu and from Tachienlu in Szechwan to Lhasa and Central Tibet. Nearly all the caravans pass through it, and usually halt in the neighbourhood for a month or so to enable their animals to recuperate on the surrounding pastures. A big annual fair is held here in the month of August.

At Jyekundo one can buy candles and cigarettes from India, brass cooking-pots and vermicelli from Kansu, tea and silks from Szechwan, and sugar from Yunnan. Tracks radiate south-east to Tachienlu, south to Chamdo (for Yunnan), south-west to Lhasa, north to Sining, north-east to Labrang and Taochow, and east to Sungpan. All around stretches for enormous distances the best wool-raising country in Asia, the northernmost edge of which is tapped by the Sining–Yellow River–Tientsin export trade.

Foreign travellers who have visited Jyekundo include Krishna, Rockhill, Grenard and de Rhins, Rijnhart, and Kozloff.

(2) From Jyekundo *viâ* Nangchen (Lungchin) to Chamdo.

This route runs south-west from Jyekundo across the various headwater streams of the Mekong, and eventually descends the Ngom Chu, the most westerly branch of that river, in a south-easterly direction to Chamdo. Another road, running south-east from Jyekundo, seems to be that followed by the Russian explorer Kozloff.

The first day's march from Jyekundo took us over a pass to a camp in a flat grassy plain watered by a tributary of the Barung Chu, the river of Jyekundo. This plain is bounded on the south by a high rocky barrier range, the Yangtze–Mekong divide, which we crossed on the following day by a high pass (Shung La, 16,000 feet), deep under new-fallen snow in early May. From this pass we descended across grassy park-lands to the Dze Chu, one of the three principal headwater streams of the Mekong, which was just fordable when we crossed it. On the way down we passed a big and wealthy monastery called Rashi (also known as Lungshi) Gomba.

One of the most remarkable journeys ever made in Tibet was that of

the Dutch missionaries, Mr. and Mrs. Rijnhart, in 1898 (see 'With the Tibetans in Tent and Temple'). Starting from Sining in Kansu, without a proper caravan or any equipment for their long journey, they eventually reached the neighbourhood of Lhasa, where they were stopped and turned back along the Jyekundo road. Arrived at a camp on the banks of the Upper Mekong, Mr. Rijnhart left his wife to go and seek assistance or ask the way of some nomads. Mrs. Rijnhart watched him follow a path round a corner of rock, and never saw or heard of him again. From the spot where her husband disappeared, Mrs. Rijnhart travelled to a monastery she calls Rashi Gomba, whence she reached Jyekundo in three days. The Rijnharts left no geographical records of their journey, but I have no doubt that we were, just twenty years later, in the neighbourhood of the scene of the Rijnhart tragedy, and that the Rashi Gomba we passed is identical with the monastery of that name referred to in Mrs. Rijnhart's story. Mrs. Rijnhart eventually reached Tachienlu after undergoing the most terrible hardships, and, as Mrs. Moyes, was subsequently well known to missionaries and other foreigners in Western China. Her experiences had however permanently undermined her health, and she died not long after.

Leaving our camp on the banks of the Dze Chu, we spent the next few days crossing the low divide of rolling downland between it and the Dza Chu, the principal branch of the upper Mekong, eventually descending to the latter through a narrow gorge, a mere cleft in the limestone mountains. On the banks of the Dza Chu (12,000 feet) we met with trees, houses, and cultivation again.

(It should be mentioned that the Tibetan names Tza Chu and Dza Chu, for the upper Yalung and upper Mekong respectively, are identical in sound and often in spelling also; but I have retained the above romanization to avoid confusion.)

The Dza Chu, where we debouched upon it, flows in a broad sandy bed between low hills of red sandstone. It is just fordable at low water, but we crossed by coracle ferry at a spot called Gurde Druka; this is probably the same as the Gurtu-tuka, where Kozloff crossed coming from the north-east and proceeding south-east (Druka means "boat-place" or ferry).

Continuing south, we crossed a formidable pass (Manam La, 16,000 feet) and descended to Nangchen (Lungchin). This place consists of a Gajuba monastery, called Tsepchu Gomba, a huge heap of Mani stones, the chief's castle, and a hamlet of mud hovels, and lies hidden away at an elevation of 13,500 feet in a ravine on the southern slope of the precipitous Dza Chu – Bar Chu divide. It is the seat of the Tibetan chief (of the rank of jyelbo or king) ruling the state of the same name which covers a large area of grass-country in the upper Mekong and Yangtze basins, extending originally beyond Jyekundo. It is an important religious centre also, and big game, mostly antelope and wild sheep, are consequently remarkably tame in its vicinity.

Leaving Nangchen, we crossed the Bar Chu, down which runs an alternative trail to Chamdo (not that followed by Kozloff). The Bar Chu, which figures too prominently on some maps of Tibet, is here a mere stream (at low water), only a foot or two deep, and with its sources probably not more than 50 miles distant. Continuing south, we crossed an easy pass and descended on the following day through a winding gorge between towering walls of rock to the Dje Chu, where we camped opposite a small monastery called Nede Gomba.

This river, lower down known as the Ngom Chu, was, in May, a swift muddy torrent, unfordable, and of about the same size as the Dza Chu which it joins at Chamdo to form the Mekong. It is here found flowing from north-west to south-east in a cultivated valley (12,000 feet) between red hills dotted with pine trees. Crossing by coracle ferry, we followed down the valley to a monastery called Gushi Gomba, where the river is spanned by a frail iron suspension bridge, the only one we met with in Eastern Tibet (they are common in the Chinese border country); the hamlet near by is naturally called Ja-zamka.

A few miles below Gushi Gomba the Dje Chu takes an easterly bend through a gorge, and our trail turned south away from the river. During the next few days we crossed two more high passes, on one of which, the Dongma La, we found ourselves marching for a mile or two along the top of the watershed between the Dje Chu and the river of Riwoche. The country traversed in this neighbourhood is a pleasant region of grassy vales alternating with pine forests, in one of which we came upon a flock of monkeys hanging in the trees at an elevation of over 13,000 feet.

Eventually we rejoined the Ngom Chu (by which name the Dje Chu is known from here down to Chamdo) a short distance below its confluence with the Bar Chu, and marched down its valley past numerous hamlets and monasteries for the rest of the way to Chamdo.

We found both branches of the Mekong a thick reddish-yellow in colour as early as May; but by November they were again a clear blue. The discoloration in summer is due to the red sandstone formation of the elevated plateau country drained by the headwater streams. These freeze in the winter in the higher valleys, when the rivers are mainly fed by the more powerful and perennially clear streams issuing from the gorges in the underlying limestone.

During this journey from Jyekundo to Chamdo we crossed all the various branches which go to make up the Mekong, Dze Chu, Dza Chu, Bar Chu, Dje Chu, and others; it is really only from Chamdo down that the Mekong can take rank as one of the great rivers of Asia (whereas the Yangtze is a big river as far up as north of Jyekundo). The Tibetans apply the name Dza Chu to the Mekong above and below Chamdo; but lower down, at Tsakalo (Yenching) for instance, they call it the Da Chu and also the La Chu. (There is a great lack of continuity in the names of Tibetan rivers, as for instance Tza Chu and Nya Chu for different

parts of the Yalung.) The Chinese call it the Lantsang Kiang from Chamdo down, being largely unacquainted with the country further north.

(3) From Chamdo by the main road *viâ* Draya Jyamdun and Markam Gartok to Batang.

This is a portion of the main south road from Lhasa to China, and having been followed by various foreign travellers in the past, does not call for much description. A great number of passes have to be crossed, and it is not the least arduous portion of what is perhaps the most difficult highway in the world.

(4) From Batang *viâ* Jyase Gomba and the Ong Chu valley to Draya Jyamdun, and thence *viâ* Yemdo (Yentaitang) and the Me Chu valley to Chamdo.

This is an alternative route between Batang and Chamdo. As far as Draya Jyamdun it is practically a straight line, thus avoiding the détour made by the main road *viâ* the Bum La and Gartok.

The Yangtze below Batang flows in an immense canyon 7000 to 8000 feet deep, and this trail climbs from the water's edge straight up the mountain-side to cross the top of the range, descending into a narrow forested valley on the other side. Our camp here lay almost on the meeting point of Markam, Sangen, and Batang territories. Another big pass has to be crossed to reach the important monastery of Jyase Gomba in the valley of the Ong Chu, the large stream which, rising on the grass lands of Gonjo, drains Eastern Markam and joins the Yangtze just below Drubanang Druka (Chupalung).

The Ong Chu is followed up almost to its sources, where a small pass gives access to a basin-like plateau at an elevation of about 14,000 feet, a marshy plain surrounded by low hills. This neighbourhood is known as Hlato (to be distinguished from the state of Hlato north of De-ge), and forms here the Yangtze–Mekong divide; from it streams flow west to Draya, south to Markam, and north to Gonjo. From the Hlato plateau we turned west, and followed down one of the headwater streams of the Draya river to Draya Jyamdun.

From Draya Jyamdun, instead of following the main road over the big Gam La, which happened to be deep under snow, we took on this occasion the trail down the Me Chu valley past the ruined monastery of Yemdo (Yentaitang), formerly one of the residences of the lama ruler of Draya. The Me Chu is left just short of its confluence with the Mekong at Drentsa Druka, and the main road is eventually rejoined at the Ipi La, two short marches from Chamdo. This Ipi La is a curious mountain knot with streams flowing in four directions, north down to Bomde, west down to the Mekong, south down to Yemdo, and south-east down to Bagung, and is the end of the big range crossed by the Jape La on the Chamdo–De-ge road; we crossed it on several

occasions, and the only time the snow on it was at all deep was in midsummer.

(5) From Chamdo *viâ* Gangto Ferry to De-ge Gonchen, and thence *viâ* Mesho and Dzenko to Rongbatsa and Kanze.

This is the main road connecting Chamdo with De-ge, and is nowadays one of the most frequented trails in Eastern Tibet. After crossing two difficult passes on leaving Chamdo it traverses easy grass country for several days, passing over the Mekong–Yangtze divide at a low grass pass called the Lazhi La. The camping-ground called Chorzhung on the eastern side of this pass lies on the headwaters of a big stream called the Re Chu, which with its southern tributary the Mar Chu drains the whole of Gonjo province. A later journey enabled me to lay down the approximate course of this river on the map.

The descent to and ascent from the Yangtze, which is crossed by coracle ferry at Gangto Druka, is made through the usual precipitous gorges, which here as elsewhere lead down from the plateau country to the valleys of the big rivers.

What was formerly considered by the Chinese as the main road from De-ge Gonchen to Kanze, north-east across a big pass called the Tro La, and thence south-east *viâ* the Yilung grasslands to Rongbatsa (see Mr. Coales' route, 1916–17, in map published in the *Geographical Journal*, Oct. 1919), had for various reasons fallen into disuse at the time we were making this journey. We followed another road further south which passes through the heart of the best part of De-ge, traversing a series of fertile little valleys draining from the Yangtze – Yalung watershed range into the former river. The chief of these are called Mesho, Dehlung, and Dzenko. The latter is an important centre lying at the junction of several valleys, up which roads lead north-west to De-ge Gonchen, east to Rongbatsa and Kanze, south to Nyarong and Litang, and west to Beyü and Batang.

The distance from Dzenko to Rombatsa can be covered in two long marches. The trail crosses the Tsengu La, the big pass over the snow range which here serves as the Yangtze–Yalung divide, and descends across uninhabited grasslands to the cultivated plains along the Yalung and the village of Rongbatsa, whence Kanze can be reached in one long march by a level road along the river.

(6) From Rongbatsa, near Kanze, *viâ* Beyü and Gonjo to Draya Jyamdun.

On our way back to Dzenko our guides on this occasion took us over another pass, the Hön La, further north, the Tsengu La being temporarily blocked by snow. The former pass is equally high, but broader than the latter, and we were able to find a place where we could struggle over through the snow.

The higher grass valleys on the Rongbatsa side of the Yangtze–Yalung divide in this neighbourhood form a nomad district called Aser, and belong to Nyarong (Chantui), and that portion of the Yalung valley can be reached direct from here *viâ* a monastery called Norlong Gomba.

From Dzenko we followed down the wooded gorges of the Dzin Chu to the village of Horbo, situated just short of the latter's confluence with the Yangtze. This river, the Dzin Chu, is one of the three big streams (the other two being the Ba Chu of Batang and the Ngü Chu of Beyü) which drain the unknown stretch of country between the Yalung and the Yangtze north of the Litang–Batang road. It is said to take its rise on an extensive grass plateau called Trungko, which forms the Yangtze–Yalung watershed and the De-ge – Nyarong boundary in that direction. There is a trail leading directly from Dzenko to Nyarong, by following which one could probably discover its sources.

At Horbo we left the river and turned south into the mountains to reach Gato Gomba, a big Red Sect monastery strikingly situated near the top of a mountain ridge at an elevation of 13,500 feet, with pine-clad slopes falling away steeply into the valley thousands of feet below. On the next day a big pass, the Mizo La, over 16,000 feet high, is crossed to reach Beyü Gomba, a similar monastery to Gato Gomba, lying in the deep narrow valley of the Ngü Chu a few miles above its confluence with the Yangtze. This is all part of De-ge state, which probably contains more big and wealthy monasteries than any other part of Tibet.

From Beyü the main road to Batang, which we followed on another journey, runs south; on this occasion we took the Gonjo trail, which leads south-west over the mountains and down to the Yangtze. Crossing the big river by the usual coracle ferry, we marched up its right bank for a few miles to a small monastery called Polo Gomba, situated at the point where the Yangtze, making a right-angle bend from north-east to south-east, is joined by the river of Tungpu from the north-west. The three big bends of the Yangtze in De-ge were unknown to European geography before Mr. Coales placed them on the map as the result of his journey in 1916.

From Polo Gomba we turned west away from the Yangtze, and after crossing two passes, the second of which, the Nadzong La, is the boundary between De-ge and Gonjo, we emerged into the valley of the Re Chu. This river, which drains the whole of Gonjo, consists of two main branches, one from Chorzhung in the north, and one from Gonjo Dzong in the south, which unite at a place called Sharundo; local information tends to show that there is a third branch from the west. The combined stream flows to the Yangtze, which I was told it joined somewhere near Gaji. It is quite an important river and deserves to be correctly represented on the map.

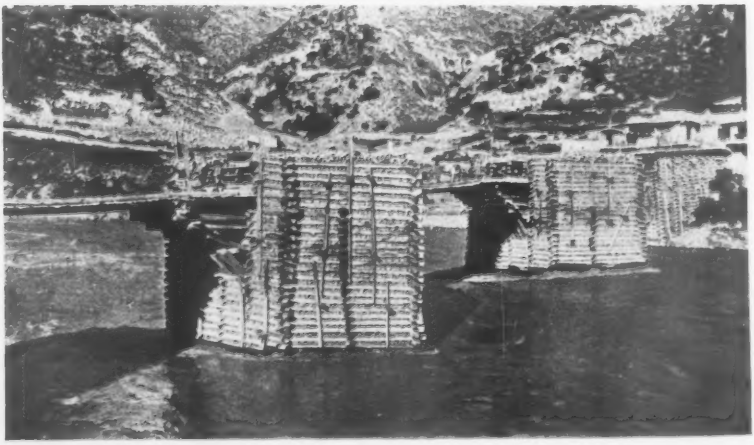
After following the Re Chu for a time and then crossing it, our trail worked away from the river, first through difficult forest country, and then

MONASTERY OF GATO GOMBA (13 500 FEET), ON MAIN ROAD FROM BATANG TO DE-GE

SNOW-PEAKS ON THE YÜ CHU–SALWEEN DIVIDE FROM NEAR DI IN TSAWARONG

SUMMIT OF TSENGU LA (15,800 FEET), DIVIDE BETWEEN YALUNG AND YANGTZE RIVERS, AND BOUNDARY BETWEEN DE-GE AND KANZE

VALLEY OF THE KARGUNG RIVER, WESTERN DE-GE



THE SZECHWAN BRIDGE OVER THE MEKONG AT CHAMDO

through a semi-desert region of red sandstone, eventually rejoining it a short distance below Gonjo Dzong. This place is the capital of the small Tibetan province of Gonjo.

I believe that M. Bonvalot must have visited Gonjo Dzong. Being deflected north of Chamdo, he seems to have come south probably from Toba to Gonjo Dzong, and thence to have continued south across the Hlato plateau to Tara in the Ong Chu valley, and so to Markam Gartok. If there is a detailed map of his route it would help to clear up some of the obscure points about the river system of Gonjo.

Draya Jyamdun is reached from Gonjo Dzong in two easy marches, crossing the grass country on the Yangtze–Mekong divide by two small passes.

(7) From Chamdo *viâ* Tsawarong to Tsakalo (Yenching) on the Mekong, and thence to Batang.

This route is known as the Yunnan Road, being the principal trade route from Yunnan into Tibet. For the first two marches the trail leads down the right bank of the Mekong, which flows in a barren gorge between mountains of sandstone until a few miles beyond the village of Wayo it leaves the river (the latter flowing south-east) and slants south across a low ridge to reach the valley of the Riwoche river, here called the Se Chu. Marching a few miles down the gorges of this stream we reached an open cultivated valley dotted with farms, called Jyedam, the seat of a small Tibetan official and the principal centre of trans-Mekong Draya. It commands the road we were travelling by, and also a road into Tibet from Drentsa Druka, the ferry across the Mekong below Yermdo, and is therefore considered an important point.

The Riwoche river (Dzi Chu and lower down Se Chu), which is here a stream of considerable size, with its valley eroded down nearly to the level of the Mekong, is incorrectly shown on British maps of Tibet as being a tributary of the Salween. As a matter of fact, it appears to follow a south-easterly course from Riwoche and Enda, and is found in this neighbourhood flowing in a deep gorge only a mile or two distant from and roughly parallel to the Mekong, from which it is divided by a narrow ridge less than 1000 feet above the two valleys. This curious configuration is characteristic of south-eastern Tibet, the land of deeply eroded parallel rivers.

Below Jyedam we left this river, which here turns south-east towards its confluence with the Mekong near by, and spent the next three days in crossing an elevated grass plateau in a south-westerly direction to a monastery called Bomda Gomba on the headwaters of the Yü Chu, a long and important tributary of the Salween. This plateau (elevation about 14,000 feet), from which another trail leads westwards and descends to the main Lhasa road at Shiyizamka (Chiayüchiao, the bridge over the Salween), forms here the Mekong–Salween divide, and belongs to

the Tibetan province of Bashü. We crossed it in very cold weather in the winter, no snow, but with the temperature below zero.

Two days' march down the flat grassy valley of the Yü Chu, past a monastery called Tento Gomba, brought us to Dzogang (pronounced Dzogung or Dzogong). The elevation here is still about 13,000 feet, and the population scanty and for the most part nomadic.

Dzogang consists of a large monastery, a hamlet, and a Dzong, and is the seat of the Tibetan official, called the Dzogang Deba, who administers the Tibetan province of Tsawa Dzogang. His territory appears to comprise the greater portion of the basin of the Yü Çhu from near its sources on the Bashü border on the plateau down to the neighbourhood of its confluence with the Salween at Menkung, the latter place lying within the territory ruled by the Tibetan official resident at Sangachu-Dzong (west of the Salween). The name Tsawarong, Tsarong, or Charong, which appears on maps of Tibet, means the "Rong," or agricultural valley part, of Tsawa.

From Tsawa Dzogang we travelled for five short marches down the valley of the Yü Chu, which is here thickly forested and very sparsely populated, to Drayü Gomba. It is to the valley of this river, trending in exactly the required direction, that the so-called Yunnan Road from Chamdo to Tsakalo and Atuntze owes its existence. It is one of the main arteries of communication in Eastern Tibet. As well as linking Yunnan with Chamdo, it connects with the main Lhasa road at Shiyi-zamka on the Salween, and it is the route generally followed by Yunnanese produce bound for Lhasa and Central Tibet; it is also much frequented by pilgrims from all parts of Kam bound to and from a sacred mountain in North-Western Yunnan. If the days of railway construction ever come in these parts the Yü Chu valley offers what is probably the easiest line of penetration for a railway from the direction of Burma up to the highlands of Central Kam.

Drayü Gomba (Dayul on our maps; the letter *r*, which is subjoined, is pronounced; while the letter *l* at the end is silent and serves only to modify the *u*, as in Beyü(l), Seshü(l), Tzayü(l), etc.) is an important monastery lying at the junction of the road we were following and one from Markam-Gartok, across the Mekong at Samba Druka, and *viâ* Drayü into the Salween valley; the Indian explorer Krishna visited it coming by the latter road. The monastery buildings lie on the right bank above the river at an elevation of slightly over 11,000 feet, backed by pine forests and a snow range. A small Tibetan military official resided here at the time of our visit.

Leaving Drayü Gomba we continued down and in the neighbourhood of the Yü Chu valley for another four marches (a march in Tibet under Tibetan conditions amounts usually to 12 to 15 miles as against 20 to 30 under Chinese conditions with posting stages, etc.) to a group of farms called Di, which lies at the junction of the trails of Tsakalo (Yen-

ching) and Atuntze (in Tibetan Jü) : a branch of the latter road leads to Menkong on the Salween, which is close by. One has here reached the difficult deeply eroded country of South-Eastern Tibet, the river flowing in a narrow forested canyon between two parallel ranges topped with eternal snow.

From Di we turned east into the mountains, leaving the Yü Chu flowing south towards its confluence with the Salween near by. The trail leads over a high pass (Di La, 15,200 feet) in the Mekong–Salween divide, and descends to the Mekong to reach Tsakalo; another pass, called the Beda La, lying a little further south on the same ridge, leads to Menkong (see Colonel F. M. Bailey's route from Batang to Assam, *Geogr. Journ.*, April 1912). The Mekong flows here, as elsewhere in Kam below Chamdo, in a deep narrow canyon hemmed in between mountains rising many thousands of feet almost from the water's edge.

Tsakalo is an important point owing to its brine wells, which lie along the banks of the Mekong, so low down that when the water rises in the summer they become flooded. The salt produced supplies all South-Eastern Tibet and North-Western Yunnan (further north the inhabitants of Kam draw their supplies of this indispensable commodity from the rock-salt deposits of the Kokonor). Tsakalo appears on most of our maps as Yakalo, or Yerkalo, which, meaning simply "the high ground" above the brine wells, is properly speaking the name of a hamlet near by where the Catholics have an establishment; this name is quite unknown to the Tibetans other than those of the locality, while the name Tsakalo is familiar to every one in South-East Kam. The Chinese call it Yenching, the meaning being much the same as the Tibetan Tsaka, *i.e.* brine wells.

Tsakalo lies in China, the Di La range being here the boundary; it was formerly a part of Batang territory, but is now a separate district. The population is partly Moso (a non-Tibetan race called by the Tibetans Djong); this is, I think, the most northerly point at which such people are found.

The main road from Tsakalo to Batang, five days' march, runs east across the Yangtze – Mekong divide by a pass called the Chia La to Tsongen (Chung-ai), and thence *viâ* Pamutang to Batang, keeping in Chinese territory all the way. Circumstances led to our following a different route, which took us north across the boundary into Markam, and then back into Batang territory, by the Bum La (Ningching Shan), and so down to Batang. The southern portion of Markam, which we traversed on this journey, is a pleasant park-like region of alternating forest and grass land, but at too high an elevation to be agreeable in mid-winter. It is all drained by the river of Gartok, the course of which, with all its tributaries, is usually very incorrectly portrayed on the map.

(8) From Batang to Beyü Gomba.

This is the main road from Batang to De-ge, and is, and always has

been, a much-travelled trail. It follows up and near the valley of the Batang river for two marches to the village of Hlamdo. This river is a comparatively large stream, comparable to the Ngü Chu and the Dzin Chu in size; as far as Hlamdo it flows north-west, and then makes a remarkable turn back on its tracks to flow south past Batang to the Yangtze. Its upper valley, inhabited by a particularly turbulent tribe of Tibetans, called Lengkashi, and its sources are unknown; it appears to flow roughly parallel to and north of the Batang–Litang road.

From Hlamdo the trail leads up a long forested valley and over a pass, the Ngupa La, into De-ge. The country round Batang is nominally under Chinese control, and the forests are full of Chagba (Tibetan brigands) from Lengkashi and Sangen, who harass travellers and ambush the caravans.

Descending from the Ngupa La we reached Gaji (Kaiyu), formerly the seat of an hereditary Tibetan official under the De-ge chief. Gaji lies in a valley parallel to and only a few miles distant from the Yangtze; the actual canyon of the latter lies in a territory called Sangen ("Bad Lands," transliterated by the Chinese as Sangai), the inhabitants of which, like the people of Lengkashi, have always been robbers and raid the Chinese and Tibetan inhabitants of Batang.

From Gaji the trail continues north up another side valley and over a pass, the Me La, which gives access to Beyü and the basin of the Ngü Chu, whence Kanze is reached by the route previously described.

Before the paper the PRESIDENT said: Our lecturer this evening, Mr. Teichman, belongs to the Consular Service of China, to which we in this Society are very much indebted. For many years members of that Service have made valuable explorations in unknown parts of the Chinese Empire, and we shall hear this evening, from the lecturer, of some work which he has done on the borders of Tibet. I will ask Mr. Teichman to give us his paper.

Mr. Teichman then read the paper printed above, and a discussion followed.

The PRESIDENT: Mr. Archibald Rose is here. He has made several journeys in that region, although not over exactly the same route. Perhaps he will very kindly speak.

Mr. ARCHIBALD ROSE: I am afraid I have little to add to the delightful lecture which Mr. Teichman has given us. I have never been in the mysterious red square shown on the map to-night, though I have bumped up against it from time to time in the course of my work and travels. Nearly twenty years ago I reached its eastern frontier, but at that time no British official was allowed to cross the border. Ten years later I was stationed near its southern frontier, and there then seemed some hope of getting in. But immediately after my arrival two travellers tried to penetrate it through the Salween gorges, and, as they were murdered by the tribesmen, further efforts were promptly discouraged. All who have had any experience of that remote corner of Asia will appreciate the fact that this lecture records a remarkable addition to our geographical knowledge. They will realize the dangers and difficulties, and the solid accom-

plishments, of the hard journeys on which we have had the privilege of accompanying the lecturer from our comfortable chairs. We have seen a country where Nature is at its wildest, where the Yangtze, Salween, and Mekong run within 50 miles of one another, cutting their deep channels through the plateaux of Eastern Tibet, with scattered tribal villages on their rocky banks. Close at hand we have seen the craftsmen at work, the achievements of their arts and crafts, and a printing press distributing its products by caravan. Until a few years ago we knew practically nothing of those men, their lives, their work, or their country. Mr. Teichman has opened a window into a new world. We shall go away to-night with a memory of snow-clad peaks, open plains, deep gorges, yaks, and monasteries. But when they read the lecture in Peking, where the lecturer and I have recently been stationed together, they will find in it even another interest. They will read those pony stories with a deeper understanding. Mr. Teichman and I were partners in a Peking racing stable. He used to buy the ponies, transform them in a few months from creatures resembling woolly bears into miniature race-horses, and then ride them to victory. People wondered why they won. Some thought it was the early gallops, others surmised a mystery about the food. And now the secret is out. Mr. Teichman has discovered in his travels that ponies thrive on the Tibetan equivalent of tea, bread and butter, and cold meat.

The PRESIDENT: One of the most interesting parts of this lecture is about the trend of the great mountain ranges, and we have here this evening Sir Henry Hayden, who was the head of the Geological Survey in India, and who has written a very valuable work on the Himalaya mountains. We shall be glad if he will give us his views on the extension of the Himalaya in the direction of Kam.

Sir HENRY HAYDEN: I am afraid I know even less than Mr. Rose about Kam, but it is a region of great interest. It was at one time supposed that the Tsangpo flowed across that country and emptied into the Irrawaddy. One of the native surveyors of the Survey of India—A. K., I think—exploded that idea by his journey through the south-western parts of Kam and brought back information of great gorges between Tibet and Assam, thereby indicating that the Brahmaputra was the continuation of the Tsangpo. The question was finally set at rest during and after the Abor expedition, largely through the instrumentality of Major Bailey—whose name we meet at every turn in all matters connected with Tibet. As we have heard to-night, Kam is a country of high mountains, which, as will be seen from the map, appear to run approximately north and south, with large rivers in between. To the west of this area are the Sikkim and Bhutan Himalaya. The general trend of the tectonic elements of the latter mountains is easterly and westerly, although here, as in other parts of the Himalaya, the subordinate orographic features not infrequently appear to trend approximately N.—S. It is possible, therefore, than if Kam were examined from the geological point of view, the orographic and tectonic features might not be found to correspond. This region, however, is probably not far from the zone in which the Himalayan and Burmese systems of mountain-folding meet; the Himalayan system being approximately equatorial and the Burmese system meridional, that zone might be expected to show a passage from the one to the other, the trend of the geological formations in its western parts being more or less E.—W. and continuous with that of the rocks of the Bhutan Himalaya and Tibet, while that of the formations on the east would gradually take on a more southerly direction to conform to the strike of the allied sedimentary systems of Yunnan and Burma. But the solution of this

interesting problem in regional geology must await a geological examination of Kam.

Colonel WIGRAM: I was in charge of the yaks in the Tibetan expedition under the command of the President here, and my feelings can be better imagined than described if I tell you that the higher the yak goes the quicker he goes, and when working at an altitude of 15,000 to 18,000 feet the yak literally disappears into thin air, because he likes to go to the top of the hill as hard as he can, and man is left behind trying to get his breath. I endorse everything the lecturer said about them, and I do not think they are reliable animals for transport work, particularly military work, which postulates the delivery of a specific quantity of goods at a given place in a given time. Provided there is plenty of time and one can go one's own pace they are useful, but they require much time for grazing, and this they cannot get on military expeditions.

The PRESIDENT: But they were useful to us in Tibet, were they not?

Colonel WIGRAM: Undoubtedly they were useful: I do not know how we should have got on without them.

The PRESIDENT: I think you will have gathered from the lecturer's paper and from the observations of Mr. Archibald Rose and Sir Henry Hayden, that that part of Kam which the lecturer described is one of extraordinary geographical interest, and not only geographical but ethnographical and zoological as well. We have here the Himalaya mountains impinging against the great ranges of China, and we have the chief races of man as the lecturer has described: the Aryan, the Mongolians, and even the Negroes meeting one another. Here is a field for the geographer of greater interest than any other part of Asia—a splendid objective for an expedition which would unravel the course of the mountains, make accurate observations as to their height, and obtain full information about the peoples, the zoology, and the botany. One particularly interesting point which the lecturer referred to in the course of his lecture was with reference to that great range which extended from the north of Lhasa down towards China. He described how one of the great rivers cut through it just at a point where there is a very high mountain. Later on I heard him drop the remark that that particular mountain was probably the highest in the region. Now a few weeks ago we had a remarkable discussion at one of our afternoon meetings on a paper by Col. Sir Sidney Burrard on the origin of mountains, in which he drew attention to the fact that in a number of cases where great rivers cut through the Himalaya mountains it so happens that just where they cut through there is a remarkably high mountain. Sir Sidney Burrard mentioned the case where the Brahmaputra or Tsangpo cuts through the Himalaya mountains and showed there was a high peak there. At the other end of the Himalaya where the Indus cuts through there is also a high peak—that magnificent peak Nanga Parbat, 26,000 feet in height. Rising from the river (which is only 3000 feet above sea-level) is an almost continuous slope, probably the biggest slope there is. It is an interesting point to work out whether there is any direct connection between the river's passage through a mountain range and the height of the mountain. That is one point on which Sir Sidney Burrard is working at the present time, and every additional piece of information like that we have had this evening will be of value to him. The lecturer referred to French travellers who had travelled in that region, and he mentioned De Rhins. I well remember entertaining him and his companion, Grenard, at Kashgar in Central Asia, in the year 1890. De Rhins was a naval officer and a man of great physical capacity and

determination. He unfortunately lost his life in Tibet, but his companion carried on after his death and did an excellent piece of work in exploring that region. The lecturer has given us some valuable information about an exceptionally interesting region. We are very much indebted to the Consular Service for the valuable work which they do on the borders of the Chinese Empire. There is a wide field for their energies there, and we hope that more of them will come to the Geographical Society and be trained in surveying and other subjects, so that the information that they can bring back will be of all the more value. I ask you to give a very hearty vote of thanks to the lecturer this evening for his most interesting and valuable address.

THE INFLUENCE OF ITS GEOGRAPHY ON THE PEOPLE OF THE AURES MASSIF, ALGERIA

M. W. Hilton-Simpson

Read at the Meeting of the Society, 7 November 1921.

I CAN scarcely hope to lay before the Society any new facts in the topography of the Aures massif in South-Eastern Algeria, upon the borders of the great desert; an area which has been mapped to the scale of 1 : 200,000 by officers of the French Service Géographique de l'Armée.

This paper, therefore, can lay claim to be nothing more than an attempt to draw attention to the influence of the geography of the massif upon its Shawiya Berber inhabitants in the preservation of manners and customs, arts and crafts, many of which have disappeared from other more accessible regions of North Africa. In order to realize how such a conservative influence has been exercised by the country upon its inhabitants, we must call to mind the frontiers of the massif and the geography of its valleys, before proceeding to consider a few examples of those traces of ancient culture which are to be found among the Shawiya to-day.

The boundaries of the Aures are clearly defined. Its northern frontier, separating it from the high-level plateau some 2800 feet above sea, upon which stand the ruins of the Roman camp of Lambessa and city of Timgad, consists of a barrier of steep wooded slopes leading up to the ridge of Mahmel, 7620 feet, and the peaks of Ishmul, 6800 feet, and Shelya, 7630 feet above sea-level, which mountains, capped with snow during a great part of the year, form the watershed of the massif. This frontier provides the Shawiya with an excellent line of defence in the north, running from west to east between the modern French towns of Batna and Khenshela on the plateau.

The southern wall of the Aures, the barren rocks overlooking the Sahara, whose wonderful coloration at sunset delights the eye of the visitor to Biskra, offers scant hope of success to an invader approaching from the desert, for the streams flowing from the high northern ridges

of the hills to lose themselves in the Sahara emerge from the massif through narrow gorges bordered by precipitous cliffs, their waters liable to rise in sudden flood when rain has fallen or snow has melted on the watershed; and such tracks as avoid the river-bed are narrow, steep, and easily defensible. From the neighbourhood of Biskra in the west, then, to the oasis of Khanqa Sidi Naji in the south-eastern corner of the massif, the region is well protected by its southern geographical boundary.

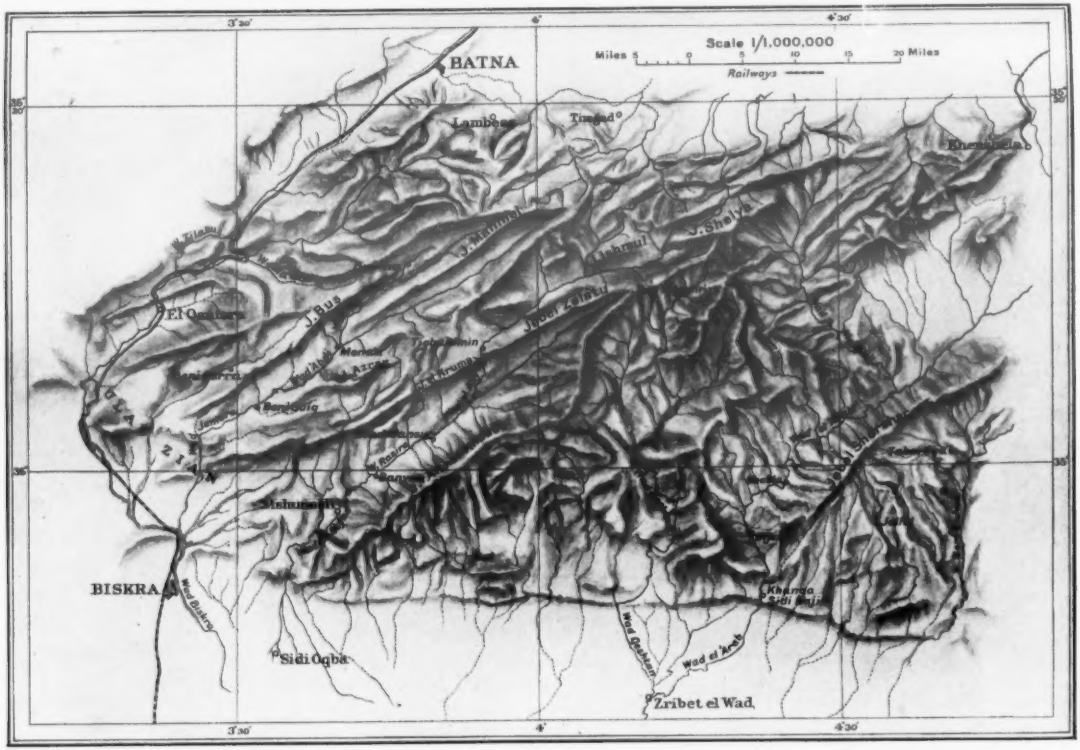
From the oasis of Khanqa Sidi Naji the great bare ridge of the Jebel Shershar runs north-eastwards towards the plateau to the east of Khenshela, attaining an altitude above sea-level of 5870 feet, and forming a mighty bastion to guard the massif from the incursions of the nomad tribes, themselves Berbers, who wander over the country to the east of the Aures.

The western frontier of the massif, beneath which now runs the railway from Batna to Biskra, though, as seen from the train, it may appear less clearly defined than the other borders of the Aures, is in reality rugged and steep enough to oppose an almost impassable barrier to an enemy approaching from the west, for its rocky walls are penetrated by but one deep defile—that which leads eastward to the valley of Bu Zina in the hills from a point near the railway at Ma'afa.

The frontiers of the Aures massif, then, are such as to favour within them the survival of ancient customs among its Berber inhabitants. The physical features of the country, so shut off from the outer world, provide a series of natural ramparts for the protection of the Shawiya within what we may term their outer walls. Thus, in the north-west the rocky amphitheatre of Mahmel protects from the north and partially encloses the high-lying valley of Bu Zina, in which rises the stream of the same name; a valley surrounded by precipitous rocky hills penetrated by two narrow gorges, the defile of Ma'afa leading to the west, and a deep ravine beneath the heights of a sacred mountain, known as the Jebel Bus, through which the Wad Bu Zina flows south to its confluence with the Wad Abdi at the important village of Menaa. Immediately to the east of the Bu Zina valley and separated from it by a rocky ridge—a spur of Mahmel—lies that of the Abdi stream.

Rising at the eastern foot of Mahmel, it flows in a south-westerly direction to join the Bu Zina river at Mena'a, through a valley (containing numerous villages) which, like that of Bu Zina and its eastern neighbour the Wad el Abyod, closely resembles a district of southern Europe. The gardens beside its stream are plentifully besprinkled with apricot, peach, and almond trees, as well as with walnuts and figs; the slopes which border it are studded with juniper and ilex.

The rocky chain separating the Abdi valley from that of the Wad el Abyod (in which chain the peaks of Azraq overlooking Mena'a rise to a height of some 6350 feet above the sea) contains high valleys and upper slopes clothed in forests of pine and cedar (the home of *Sus scrofa*,



SKETCH-MAP OF THE AURES MASSIF

Jebel Shershar

SHEBLA VILLAGE FROM THE SOUTH-WEST

Jebel Bus

BU ZINA VALLEY LOOKING SOUTH-WEST FROM TIJGAD

the European wild boar), whence distant views of the snows of Ishmul to the north provide glimpses of scenery more suggestive, perhaps, of an Asiatic hill country than of mountains upon the fringe of the African desert.

But in descending the Wad Abdi from Mena'a, riding largely in the bed of the stream, the traveller finds that in a space of some 12 miles as the crow flies he has left behind him the European scenery of the country about Mena'a, and, having passed between ruddy cliffs in the gorge just to the north of the little date oasis of Beni Suiq, he emerges into a wide and typically North African desert valley at Jemora, where the stream, meandering through groves of many thousands of date palms, flows on to the Sahara between ranges of hills devoid of vegetation, whose rocks glow at evening in all those successive shades of orange, pink, and purple which combine to form the glory of a sunset upon barren desert hills. In these 12 short miles he has left a land of fair-haired Berbers for a desert valley dotted with the tents of the Ulad Zian nomads, boasting of an Arab descent; he has exchanged the woodland home of the wild boar for the barren plains and foothills which afford meagre sustenance to the Dorcas and Cuvier's gazelles, and the bare crags among which may be sought *Ovis Lervia,* the Barbary sheep. I have nowhere met with so sharp a contrast in peoples, fauna, and flora as that to be found in the short space between Jemora and Mena'a.

The Wad el Abyod, the valley of which lies to the east of the Wad Abdi, also flows from north-east to south-west, rising at the foot of Shelya and passing beneath the southern slopes of Ishmul. For the northern part of its course this river valley resembles closely enough that of Abdi above Mena'a; but at a point near the centre of its course it turns to the south, and, flowing through the chasm of Tighanimin, the only cleft in its south-eastern wall (a ridge known as Zelatu above this gorge, where it reaches 5670 feet, and Kruma—4960 feet—to the south-west of the ravine), it emerges into a basin, some miles in width, which forms a sort of hinterland between the European scenery of its upper course and the Africa of its lower reaches.

From this basin onwards the stream, hence known as tbe Wad Rasira, runs south-westward through a wide valley between the ridge of Kruma to the north-west and that of Ahmar Khaddu—meaning the "Red-cheeked Mountain" from its hues at sunset—to the south-east, this wall of the valley attaining an altitude of some 6320 feet above sea-level. The ridges of Zelatu and Ahmar Khaddu, branches of a common stem known as the Ras Tageshrirt—6480 feet—enclose this valley and the basin at its head from the north and north-east, as does Mahmel that of Bu Zina. In the centre of this wide valley the stream has cut for itself a ravine which must, I think, rank first among the scenic wonders of the Aures, if not of the whole of Algeria.

The traveller crossing the valley from side to side sees nothing of the

river nor any outstanding feature to break the barren monotony of surroundings described by Colonel Lartigue as "un pays épouvantable, où il semble que les pierres ont plu en deluge," until suddenly he finds himself upon the brink of a narrow chasm, at the foot of whose precipitous cliffs the Rasira stream flows through a belt of date palms, which the depth of the cañon reduces to the proportion of mere oleander bushes to the eye of the beholder from the brink of the great ravine. Clinging like eagles' nests to the rim of the cañon, overlooking their plantations below them, are to be seen numerous Shawiya hamlets, their houses built flush with the edge of the cliff from which, at a distance, they are scarcely distinguishable. This cañon of the Rasira, throughout its dozen miles of length, is marvellous in its grandeur and wild beauty.

Upon emerging from its cañon the river enters broken country, in which it waters a large date oasis at Banyan, before entering another but shorter gorge—a deep cleft in a solid wall of rock, which forms the central gateway of the southern Aures, through which it passes to the oasis of Mshunesh on the edge of the Sahara. Thus it will be seen that the western and central portions of the Aures are subdivided by rocky ridges into a series of valleys, each approached by but one or two deep defiles, which valleys may be likened to small fortresses within the natural walls which guard the massif as a whole.

To the east of Ahmar Khaddu, of which the eastern face is very precipitous, lies a tangle of lower foothills and valleys, through one of which the Wad Qeshtan flows from the Aures to the desert, an area far less densely populated than the country to the north-west of the Red-cheeked Mountain, its inhabitants mostly leading a nomadic life.

We did not, therefore, visit these lesser valleys, for we preferred to seek out the Shawiya villages upon either side of the Jebel Shershar, the eastern bastion of the Aures. Beneath the western slopes of this ridge the most considerable of the poor Aures streams, known as the Wed el Arab, flows through a remarkably barren country until it reaches the Sahara at the oasis of Khanqa Sidi Naji after passing through a defile of the same name.

This valley, too, contains but few villages, for many of its inhabitants move up and down the barren hills with their flocks of goats and sheep according to the season and the state of the pastures: as happens also east of the ridge of the Jebel Shershar, where the Wed Beni Barbar flows southwards through the foothills to the desert. But though many of them lead a nomadic or semi-nomadic life, the inhabitants of the slopes of Jebel Shershar are Shawiya; and in such villages as they possess we found that Berber culture could be studied.

In the belief that in such an environment as I have attempted to describe we should be likely to find the Berber as little altered by the successive waves of conquest which have swept over North Africa as anywhere in Algeria, my wife and I selected the Aures massif as the field for

our ethnographical work. Making our base at the little inn of El Qantara on the railway to the south-west of the hills, we undertook each year a series of journeys in the mountains, returning between them to El Qantara to replenish our stores. We travelled light. Accompanied by no servants other than a native mounted orderly, whose services the French authorities have always kindly placed at our disposal, we carried with us sleeping-valises, and but few stores. Relying for accommodation upon the never-failing hospitality of the Qaids and the headmen of smaller villages, we found that we could enjoy better opportunities of studying Berber life by actually living in native houses in the villages than if we encamped outside them, opportunities which fully compensated us for the discomforts we often had to face.

Apart from the physical characteristics of the Shawiya, the fair skins and hair and the blue eyes so commonly to be seen among them, and the old Berber tongue which they speak but can no longer write, with neither of which we were directly concerned, the first outstanding difference between a village of the Aures and one of the plains which forced itself upon our notice lay in the construction of its houses. These are built of stone; mud and straw, sun-dried bricks, as used in the desert, are not to be seen in a true Shawiya village, though from east to west across the southern Aures walls built of such bricks, especially in new houses, may be found, showing how the building of the desert has encroached upon the land of the Berbers, advancing up the course of their streams; but this sign of a tide of foreign culture has flowed but a very short distance into the hills, having merely lapped around the edges of this island of Berber culture.

A close examination of dwellings in all parts of the Aures has shown that, within the massif, is exemplified every stage in the evolution of the human habitation from the simple unprotected cave to the multi-storied stone-built defensible granary, known as a "qal'a," which is so noticeable a feature of southern Shawiya settlements to this day.

The Shawiya goatherd, often obliged to spend some time away from his village, usually bivouacs beneath a projecting rock or in a cleft in the rocks on a hillside. Should his stay there be of long duration he will be joined by his family and by his friends with their families, the little colony protecting themselves from the mountain winds by erecting a screen of brushwood in the opening of their cave or cleft. Examples of these caves, occupied during a great part of the year, are to be found in the gorge of Tilatu and near Beni Ferra in the south-west of the massif, as well as in many other districts of the hills. In other cases the screen of bushes is replaced by a wall of stones, partly closing the entrance to the cave, as in many dwellings of the Rasira valley, and this walling-up of the entrance has developed until it reaches the stage of the completely walled-in caverns of Ma'afa and the lateral clefts in the cliff-face of Takarbust, in the Ma'afa defile, which, entirely closed by well-built walls on their open

side, form snug and weather-proof cave-dwellings in the almost inaccessible face of a cliff.

The cave-dwelling Shawiya, dissatisfied with the irregular shape of the natural back of his home, at some time began to "square" this by means of masonry at the back and sides of his dwelling, as may be seen at Ma'afa, thus providing himself with a house of which the roof and floor only were of natural rock. Then, when the ledge on which he lived was wide enough to permit of such an extension, he threw forward his outer wall, connecting the top of this wall with his cave by means of a roof of mud supported upon rafters of juniper and laths of twigs. Such dwellings, half-house, half-cave, are to be found inhabited at Tilatu. And so by easy stages throughout the Aures we find the house gradually extending forward from the cave or excavation in a steep hillside until it stands alone on level ground, the typical rectangular Shawiya house of stone.

The finished house, to the somewhat rickety walls of which stability is lent by the insertion of one or more courses of beams resting upon strata of sticks running transversely through the wall, is usually built of untrimmed stones held together with mud, but trimming of the stone is practised in the Bu Zina valley, where houses are better and more regularly built than elsewhere, possibly owing to the neighbourhood of the Roman centres of Lambessa and Timgad beyond the ridge of Mahmel, whence settlers penetrated the Aures and may well have left their mark upon the buildings.

In dwellings too large to be spanned by single branches of the small local juniper (*Juniperus phœnicea*) the rafters of the roof are supported upon pillars of that wood. The roof, except in certain cases in the south, where Arab influence may have produced some effect, is not surrounded by a parapet, for the Shawiya do not keep their women from the gaze of passers-by, and a parapet would hinder the removal of snow in the higher villages, with consequent damage to the roof. Beyond cooking-pots, a twin-stone quern, a basket slung from the roof to form a cradle, and a loom, the houses contain nothing which can be termed furniture, the family usually sleeping upon a platform of sticks beneath which their domestic animals pass the night.

As regards their general condition we can, from a now considerable experience, thoroughly endorse the statement of Leo Africanus which refers to a Berber people of Morocco: "Their houses are very loathsome, being annoied with the stinking smell of their goates . . . neither sawe I euer, to my remembrance, greater swarms of fleas than among this people."

Before examining the continued growth of the house from one to several stories we may digress for a moment to seek the reason for this expansion. In order to protect themselves and their grain from attentions of roving bands from the hungry desert which might be driven by famine to cross the rugged boundaries of the massif in search of plunder,

the Shawiya, especially in the southern portion of the Aures, even now construct their villages with a view to defence, almost invariably placing them high upon the angles formed by the junction of tributary ravines with a main valley, sites with which the geography of their country has liberally supplied them.

In describing Jugurtha's stronghold near the "Muluccha" [Muluya] river (on the Algerian–Morocco border) Sallust has been translated as follows: "There rose amid the surrounding plain a rocky mountain, broad enough at the summit for a fort of moderate size, and reaching to an immense height. A single narrow approach was left; all the rest was as precipitous naturally as if labour and design had been employed to form it." And, farther on, "the path used by the garrison was extremely narrow, with a sheer descent on either side."

There are to be found in the Aures to-day a large number of Shawiya villages to which this description applies with remarkable accuracy. At Ulad Mansur upon the eastern lip of the Rasira cañon, the village is built upon the apex of a rocky angle at the junction of two ravines and can be approached by mules by but one track, winding up from the valley below to the single gateway of the village granary or "qal'a"; though pedestrians in single file can follow a precipitous track resembling a flight of rough-hewn steps up the very knife-edge of the spur, this path ending in a shaft through the rock up which the foot passenger must struggle to emerge in the village itself.

Jellal, beneath the eastern slopes of the Jebel Shershar, is built, as is Ulad Mansur, with the walls of its houses rising flush with the edges of the precipitous promontory, or rather twin promontories, on which it stands; access to the settlement is possible from one side only, and that side defended by the walls of its rearmost houses.

Taberdga, a few miles to the north of Jellal, crowns the summit of a steep knoll at the junction of three ravines, this knoll being approachable by means of a path following a cleft in the precipitous side of the mountain to which it is joined by an isthmus of rock, no more than 10 yards in width, a cleft so small that the mule rider must lean low over his animal's withers to protect his head from the overhanging rocks, a chasm some 300 feet in depth yawning beneath him at one side. The isthmus itself is spanned by walls and the village gateway, beside which cliffs fall sheer to the ravines below on either hand. Any one of these three villages, selected merely as examples, would seem to fall in exactly with Sallust's description of a Numidian stronghold of 2000 years ago.

Obviously the restricted area of the apex of a spur could not long stand the increase of population in one-storied huts. Indeed, the very position of the huts built upon the uneven surface of a spur with the floor of one often upon the same level as the roof of its neighbour below it, would naturally lead the Shawiya to transform the terrace-roof of a single apartment into the floor of a building above it by simply increasing the

height of their walls. Houses thus built are very common in the southern Aures; in fact, we lived in such an one at Ulad Mansur.

Need for economy of space also doubtless called the attention of the Shawiya to the fact that it was as easy to throw rafters and floors across their narrow lanes as to put roofs upon their houses, so that it was but a step from the construction of two-storied buildings to the multi-storied structure with covered lanes which, with more or less uniform outer walls and approached as a rule by a single gateway, constitutes the qal'a, or defensible granary, which is a feature of so many southern Aures villages to-day, and which may fairly be supposed to be the direct descendant, probably but little changed, of Jugurtha's "fort of moderate size" or "treasure house" described by Sallust so many centuries ago; a structure preserved in the fastnesses of the Aures that has disappeared from other more accessible regions of Algeria.

The qal'a, the evolution of which from a single-storied hut seems to be clearly attributable to the natural features of its site, is still used as a storehouse, but to a decreasing extent as a dwelling, for the settled conditions prevailing under the French are inducing the Shawiya to build outside the precincts of their village forts and even to descend into the valleys below them.

In order to stock their granaries the Shawiya cultivate every possible foot of land in their narrow valleys, and the irrigation of their fields has led to the continuance in use in some villages of a primitive type of water-clock for apportioning the limited supply of water available. The system of irrigation employed in the Aures and in such of the oases at the foot of the hills as are watered by more or less perennial streams is simple.

The stream is tapped by means of barrages, or lines of boulders placed obliquely across the watercourse, so that a portion of the stream is deflected into narrow artificial channels, known in Algeria as saqiyas, which conduct the water through the area to be irrigated. The main saqiyas, after supplying branch channels, each watering a group of gardens, discharge their residue of water into the river. This system has been developed until each group of gardens contains a network of miniature canals carried across depressions, and sometimes, as at Beni Suiq in the south-western corner of the massif, across their parent river, in wooden aqueducts often made of the hollowed stems of date-palms. These saqiyas, which are simply dug in the soil without reinforcement of their sides, require constant surveillance to counteract the silting which occurs in them after heavy rain has fallen or snow has melted on the watershed of the Aures; in some districts, therefore, an official is placed in charge of each branch saqiya, whose duty it is to exercise this surveillance and to call upon the riparian owners to make good such damage as it occurs, each landed proprietor being also responsible for the upkeep of a proportion of the barrage in the river whence he indirectly obtains his water-supply. The construction of a new saqiya, now the care of the French,

appears formerly to have been undertaken by some important chief or wealthy native who received as much as two-thirds of the palms in the newly irrigated area as a reward of his outlay and initiative.

As we have seen already, the main streams of the Aures flow southwards from the watershed in the north of the massif to lose themselves in the desert; upon the quantity of water allowed to come out of the hills, therefore, oases such as Sidi 'Oqba and Zribat el Wad on the edge of the desert depend for the production of the dates necessary for the subsistence of many nomad tribes. Nowadays this amount is controlled by the French, but before their arrival any village of the hills had the right to as much water as its people cared to use regardless of the requirements of their neighbours lower down the river's course, provided that they allowed such water as they did not make use of to return to the parent stream. Messieurs Hanoteau and Letourneux ('La Kabylie,' 2, 251) expressly state that this right was held also by the Berbers of the coastal mountains, and Colonel Lartigue ('L'Aurès,' pp. 438, 439, and 445) shows that the Shawiya were in the habit of exercising it. It is evident, therefore, that disputes arising from the vital question of water-supply must have been frequent and probably sanguinary, not only between the Berbers of the hills and the nomad Arabs of the desert, but also between neighbouring Shawiya settlements, and would also have disturbed the peace of individual villages had not the clepsydra or water-clock of ancient times been kept in use to apportion its division.

When the day arrives on which the waters of a main channel are to be turned into a given one of its branch saqiyas (an operation performed without the aid of gates by merely blocking the main channel with earth and cutting an outlet in its side to connect it with the branch) owners of the gardens watered by the latter repair to a point overlooking their land, bearing with them the water-clock by means of which their periods of irrigation are to be timed.

The quantity of water to which each is entitled varies, for it is purchased, apart from the purchase of his land, by each individual farmer, who leaves it as he desires at his death and who may lend or sell any or all of his period of irrigation as he wishes. From 120 to 150 francs for one hour's uninterrupted flow of a branch saqiya every twenty days in perpetuity was stated in 1920 to be the price of irrigation at Beni Ferra.

As the side of the saqiya is cut to admit the water to the first garden to be irrigated, the water-clock, a small bowl of copper or zinc perforated in the centre of its bottom by a minute hole, is carefully placed upon the surface of a pail or earthen jar of water in which it automatically sinks as water enters through the hole. Each owner of land is entitled to so many sinkings of the clock, rather than to any definite number of hours or minutes of irrigation; the clock, therefore, is refloated the moment it sinks, and a pebble is placed on the ground by the individual manipulating the clock to indicate that the farmer has received his first sinking, an

additional pebble being added to record his score each time the clock is refloated. Meantime a workman, who has been regulating the flow of the water over the garden or field, which is usually subdivided into rectangular patches by means of very small banks of earth to assist him in his task, is ready on the instant to stanch the rush of water from the saqiya when the owners beside the clock shout to him that his period is at an end; the water is then at once admitted to the next garden to be irrigated.

This division of water, carried out in the presence of the owners concerned and usually of a member of the village council, seems to be considered as equitable by the Shawiya. The clock itself is usually the property of the village council, and so is regarded as the legal measure. The official bowls appear to sink once in fifteen minutes, those I tried being fairly accurate; but there are in existence a number of privately owned clocks, used unofficially between friends, the time of whose sinking varies. Thus the bowl I collected, now in the Pitt-Rivers Museum, sinks once in about ten minutes, while a specimen from Tolqa on the edge of the desert, collected by Mr. W. J. Harding-King, who has most kindly supplied me with very full notes upon it, varied in its time of sinking from four minutes nine seconds to four minutes four seconds in a series of nine tests, excluding the first test, in which, the clock being dry, the time was about twenty seconds longer.

Mr. Harding-King's clock differs in form from the one I collected. My specimen, which I experienced great difficulty in obtaining, consists of a circular bowl of hammered copper; its side about 1 millimetre thick, its diameter $5\frac{7}{8}$ inches at the lip and 6 inches at the bottom, which is slightly convex, the depth of the vessel being $2\frac{1}{8}$ inches at the side and $2\frac{1}{4}$ inches at the centre. It weighs 16 ounces.

Mr. Harding-King tells me that his specimen closely resembles my own in size and shape, save that its diameter is slightly larger at the bottom than at the top, and that its bottom is slightly more convex than that of my specimen. Both specimens are made of copper of the same thickness, and the bottoms and sides of both appear to be similarly joined by dovetailed edges. Some of the dovetails in the Tolqa specimen, however, appear to consist of separate pieces of copper distinct from both bottom and side.

The perforation for the inlet of water in the Tolqa clock (3·5 mm. diameter) is greater than in my Beni Ferah example (1 mm. diameter), and Mr. Harding-King's bowl is fitted on the inside with a vertical tube, some $\frac{3}{4}$ inch in height and $\frac{3}{16}$ inch in diameter, which is fixed to the bottom of the bowl, and is intended, as Mr. Harding-King has stated in the *Geographical Journal*, vol. 50, p. 361, to regulate the flow of the incoming water. It is in this tube that the greatest difference between our clocks is to be found, and, although a native once attempted to describe to me a clock fitted with a tube, I was unable to follow his vague description, and I have found no such clock myself.

ISHMUL FROM THE NORTHERN SLOPES OF AZRAQ

LOOKING NORTH FROM JEMORA

Kruma

Gorge of ↓ Tighanimin Zelatu

TIFELFEL FROM THE SOUTH, WITH QAL'A, AND HOUSES HALF UNDERGROUND

TABERDGA FROM THE NORTH

With the exception of these two clocks, I have heard of but one other water-clock of the sinking type from North Africa, a type to be found in India, Burma, and Ceylon. Mr. Budgett Meakin gives a brief reference to this type in his work on 'The Moors' (p. 403), and he also alludes to a Moor who manufactured water-clocks at Toledo for astronomical calculations in his 'Life in Morocco' (p. 374).

A different type of clepsydra, however, has been reported from North Africa, namely, one in which the bowl is filled and allowed to empty upon the principle of an hour-glass. James Richardson ('Travels in the Great Desert of Sahara,' 1, p. 185) noted an earthenware specimen at Ghadames in Fezzan, also used in connection with irrigation; Berthelon and Chantre report an evacuating clock, still known by a Greek name "cadous" (κάδος), from Qabes in Southern Tunis; while El Bekri in the eleventh century found this type, then known as "cadès," at Tozer, some 120 miles to the west of Qabes. It seems remarkable that the two types of water-clock should be found in such comparatively close proximity to one another, for although Sir Everard im Thurn informs me that he has seen and collected a specimen in Ceylon, used alternately as an evacuating and sinking clock, Mr. Harding-King's specimen could certainly not have been so used.

From such scanty evidence as I have as yet been able to collect it is difficult to trace the origin of the Beni Ferra clock unless we consider that the fairly numerous remains, some of them in use to-day, of rock-hewn Roman "saqiyas" to be found in the Aures and, as in the gorge of El Qantara, in the neighbourhood of the massif, may indicate that the water-clock was used when these were new to apportion the flow of their waters as it is at Beni Ferra and elsewhere to-day.

Though the land of the Shawiya farmers is very carefully tilled, compared with that of their neighbours of the plains, the tools with which they work are of the roughest description. The smaller of the two wheelless ploughs in use is nothing more than an enlarged prehistoric hoe, its ancestor, fitted with a steering handle; the larger variety, drawn by a pair of mules, is but slightly more elaborate and resembles closely models I have seen of the modern Cyprian plough. Both are fitted with iron shares.

The ceremonies with which the ploughing season commences, upon which I have published a few notes elsewhere, will probably, when carefully examined, be found to form a part of an ancient cult such as that of which I shall point out some survivals at the end of this paper.

In addition to cereals and vegetables the Shawiya cultivate a large number of fig and fruit trees as well as olives, from which latter, in the west, centre, and east of the massif, a considerable amount of oil is extracted. The two methods of obtaining this oil furnish excellent examples of the survival of ancient arts and crafts in the cultural island of the Aures. I gave some description of them in *Man* of August 1920.

The more modern of these methods, in which the pressure is exerted by means of a lever formed of a tree-trunk weighted with a stone, which we found in use at Beni Ferra, so closely resembles a press of, at latest, Roman times, reconstructed by Prof. J. L. Myres as a result of his work among the ancient sites of Tripoli, that illustrations of the two would be almost interchangeable (*Proc. Soc. of Ant. of London*, Second Series, 17, 286).

This olive press at Beni Ferra is especially interesting as an example of the influence of geography and climate upon the persistence of ancient crafts in the Aures, for whereas in the high-lying village of Beni Ferra, enjoying a greater rainfall than the country at the foot of the hills, olives still flourish to such an extent as to keep this and other presses at work, in the now dry and barren stony desert below, at an altitude of 1640 feet, a mile or two to the south-west of El Qantara oasis, are to be found sites, evidently dating from Roman times, upon which fashioned weight-stones and press-beds of exactly similar olive-mills can be seen, although the olive has long since ceased to flourish any nearer than at Beni Ferra, some 10 miles in a direct line across hills which rise to some 4320 feet above the sea.

The more primitive system of olive pressing was noted in the Jebel Shershar, in which the olives are crushed upon a hardened floor by means of a heavy stone pushed to and fro by the foot of man; then boiled, and enclosed in baskets, they are pressed for the extraction of the oil between two slabs of stone, upon the upper of which stands a woman transferring her weight from one foot to the other while the oil exudes into a circular trench chipped in the lower stone. This must, I should imagine, be one of the oldest systems of obtaining oil that can be found in use to-day.

Living, as was our habit, in native huts in the villages themselves, we found ample opportunity of studying Shawiya arts and crafts, and, owing to the presence of my wife, we were able to observe those of the women as closely as those of the men, though the Moslem Berber woman, despite the far greater freedom she enjoys than the poor drudge of a desert oasis, could scarcely be expected to gratify the curiosity of a male European travelling alone. Thus, between us, my wife and I were able to observe in detail their methods of spinning, one of which, I believe, has not yet been described, and weaving upon a simple vertical hand-loom, in which no shuttle is employed, for more advanced looms, such as those of Tlemsen and the card loom for ribbon used at Constantine and Tunis, have not yet penetrated into the Aures. Nevertheless the material woven for burnouses, pillows, and rugs is well made and durable, as is the tent-cloth and sacking manufactured upon a very primitive horizontal loom, often rigged up in the village street, in connection with which a rudimentary shuttle is employed, merely a plain stick around which the weft is coiled. Every Shawiya woman we have met is skilled in the art of

weaving. The very great majority are also capable of manufacturing for themselves such simple articles of pottery as they require for household use. These bowls, dishes, and stew-pots are fashioned by hand without the aid of a wheel, and the vessels when nearly dry are polished with a snail-shell or smooth pebble to give them an even surface. After drying in the sun a number of pots are placed upon a heap of stones and covered with brushwood and refuse, the burning of which bakes the vessels beneath it.

In most parts of the massif a coating of varnish, consisting of shellac bought from Kabyle pedlars or the gum of a local juniper (*Juniperus oxycedrus*), which is applied while the pot is still hot from the baking, is all the ornament added; but in some villages, especially at Beni Ferra, a number of bowls are decorated with very rough patterns in reddish earth laid on with a doubled straw. These patterns, far more primitive than those employed by the Kabyle Berbers near the coast, though crude, are interesting in that two at least of them seem to constitute traces of a very ancient Libyan cult.

The first of these, two lines of herring-bone forming two sides of a triangle, is now known to the natives as "jerida," or palm-branch, and it is very commonly to be found upon such articles of pottery as are decorated in the Aures, and, almost universally, in the facial tattoo marks of the women. In it Dr. Bertholon ('La Berbérie Orientale,' p. 482) sees a direct connection with the sign of Ta-Nit or Neith, the goddess of Saïs in the Nile Delta, one of the earliest Egyptian goddesses, who was reported to have been introduced there from Libya, whose worship was adopted by the Phœnician settlers at Carthage, and whom Herodotus and other classical writers have identified with Athena.

In addition to this design, another, a line resembling an inverted W, known to the Shawiya as the "scorpion," is also to be found upon the pottery and is used in tattoo, and may possibly be a relic of the days when, according to Sir E. A. Wallis Budge, "the scorpion was venerated in Egypt at a very early period," and "was sacred to Isis," which divinity had assumed the attributes of Neith ('Gods of the Egyptians,' 2, 377). There is, however, no proof available that the veneration of the scorpion came from the west. But whether or not we are prepared to accept the flimsy evidence of Shawiya designs in attempting to establish a connection with a former cult of Neith, we have further traces of it in certain ceremonies and fêtes observed in the Aures which appear to be somewhat more clear.

It is well known that in parts of Barbary there exist many ceremonies and rites now believed by the natives who perform them to constitute a part of the ritual of Islam, but which in reality are of much greater antiquity. The persistence of these rites seems due to the physical features of the land, for we have it on the authority of Dozy that at the time of the Arab conquest Sidi Oqba ben Nafi, the eastern general,

preferred to work upon the superstitions of the hill people in his efforts to introduce his faith among them, rather than to attempt to carry that faith by force of arms into such natural fortresses as, for example, the Aures massif. In such an environment as I have endeavoured to describe, therefore, relics of a former cult may well be expected to survive.

Sir E. A. Wallis Budge tells us that in Egypt a "very important festival was that kept in the spring, on the birthday of Osiris, the son of Isis-Net, which the late Dr. Brugsch identified with the birthday of the spring sun" ('Gods of the Egyptians,' 1, 463). Dr. Budge, recalling that in ancient times Neith of Saïs had been referred to as the "mighty mother," states ('Gods of the Egyptians,' 1, 457) that the chief characteristics of her cult must have been those of a local Delta or Libyan goddess of Nature, probably including ceremonies intended to represent the processes of generation and reproduction.

We may, therefore, regard as a possible survival of her worship the Spring fête still observed by the Shawiya of Mena'a and the Abdi valley. On a date at the end of our February (the Shawiya, incidentally, use the Roman names of the months) the women and girls of Mena'a go overnight to the wooded hills north of the village and pass the night in the open, cutting and tying up into faggots firewood from the stunted trees around. Next morning a crowd of men and boys from the village go out to escort the women home to the music of drum and hautboy and the firing of blank charges from gun and pistol, the women carrying their loads of faggots and giving vent to the long-drawn quivering cry of joy, identical with that of ancient Greece, which, in the opinion of Herodotus, the Libyan women uttered very sweetly.

Each woman brings with her a fresh young shoot of some mountain tree or bush and wears in her head-dress a few blades of young green corn, the boys also carrying some such emblem of budding life as a shoot of pine. Every now and then the procession halts by the wayside to allow the women to lay down their burdens and to watch the antics of one of the young girls who performs a *danse du ventre* to the strains of the "band."

Upon arrival at the village the women disperse to attire themselves in their best, while the band, with a goodly number of followers, visits first the zawiya of a celebrated maraboutic family, and, after playing before it and at one or two other places in the village, finally takes up a position in an open space on the steep slope among the houses. Here it is rejoined by the women, who sit in a prominent position—but apart from the men—to listen to the drum and hautboy and watch the efforts of youthful *danseuses*.

Upon the second and third days of the fête similar ceremonial takes place, but the place of honour at the band concert is given to the very young girls, even the smallest of children being brought to the ceremony attired in bright clean garments and masses of silver ornaments borrowed from their relatives.

CAVE DWELLINGS AT TAKARBUST, MA'AFA DEFILE

RASIRA CAÑON AND VILLAGE OF ULAD MANSUR FROM THE WEST

THE QAL'A, BANYAN

WATER-CLOCK, BENI FERRA

Upon each day, in the evening, is played the ancient game of "koora," which is widely played in the spring in many areas of North Africa. This game resembles a primitive hockey, and is played with heavy clubs or branches of juniper, etc., and a stone.

At Mena'a the village is divided into two sections, east playing west, but in other villages of the Wad Abdi a game of married *versus* single is played before large crowds of both sexes. The game is most violent—I have myself rendered first aid to a number of casualties resulting from it —and it not infrequently degenerates into the battle which, even in its milder forms, it resembles. But though this game is played by men and boys (and sometimes by girls in the seclusion of their houses), elsewhere in North Africa, at Mena'a, in the Abdi valley and other parts of the Aures, it is played quite openly and before spectators by the women and girls at the feast of the Spring. If scarcely so violent as the "koora" of the men, the game is played with great vigour and spirit by the gentler sex, and there seems little doubt that it is a persistence of some such ritual as that to which Herodotus (iv. 180) refers when he describes the ceremonies of the natives around Lake Tritonis (the modern Shotts of southern Tunis), some 150 miles to the south-east of the Aures massif.

Prof. J. L. Myres has kindly furnished me with the following translation of Herodotus' passage: "The Ausean maidens keep year by year a feast in honour of Athena, whereat their custom is to divide into two parties and struggle against one another with stones and sticks, saying that they are performing their ancestral rites to the deity who was born in that place whom we (Greeks) call Athena. If any of the girls die of their injuries they say that they are not true maidens. Before the signal is given for them to fight they do this in common: they dress up the prettiest girl on each occasion in a Corinthian helmet and full Greek armour, put her in a car, and draw her all round the lake."

That Herodotus uses the word "stones" in the plural is by no means extraordinary, for I have myself often seen several games in progress at the same time in one of the few available level spaces in an Aures village; while the dressing up of a pretty girl by the Auseans may well be considered to have survived in the gaily-decked *danseuses* who perform to-day at the spring feast of the Shawiya.

Other traces of the worship of Neith or Athena thus referred to by Herodotus some twenty-four centuries ago, may be found by careful examination of the customs of the Shawiya within the ramparts of the Aures massif. But the search for such traces, if it is to be made at all, must not long be delayed. The student who would examine in detail the evidence of the conservative influence of the geography of the Aures upon the culture of its Berber inhabitants—a very few items of which evidence I have endeavoured to put forward in this paper—should lose no time in setting to work. Roads open to vehicular traffic are to be laid through the heart of the hills, thus linking their secluded valleys with the outer

world, and many Shawiya, leaving for the first time their mountain homes, have served France upon the fields of Flanders and the Argonne, to bring back with them to their villages among the crags more seeds of change and progress than have penetrated to the cultural island of the Aures for untold ages in the past.

I cannot conclude this paper without expressing my deep sense of gratitude for the facilities granted us by the French authorities and for the ready assistance and kindly hospitality which we have ever received at the hands of French officers—military and administrative, European and native—during our wanderings in and around the Aures. Without such assistance, for which we have never appealed in vain, we could scarcely have undertaken our researches at all; with it, difficulties vanished and our path became easy and delightful.

Before the paper the PRESIDENT said: Mr. Hilton-Simpson has been travelling in Algeria, and has been devoting himself especially to the study of primitive surgical instruments. During that time he has also been able to study the effect of geography upon the character of the people, and I have very much pleasure in introducing him to you and asking him to give his lecture.

Mr. Hilton-Simpson then read the paper printed above, and a discussion followed.

Mr. HARDING KING: I am afraid my knowledge of the Aures massif is confined to the immediate neighbourhood of El Qantara. It has been very interesting to see how the peculiar geographical conditions there have tended to keep the Shawiya as a race apart ethnographically. Those irrigation methods in North Africa are an interesting study. As far east as the Egyptian oasis of Kharga we find long horizontal infiltration galleries cut underground through a water-bearing stratification, which are also found as far west as the Twat group of oases in the south-west of Algeria, showing, I think, a connection in the irrigation methods between the two districts. Those curious water-clocks which you get in Algeria are, I believe, a later idea than the system which is in use in the Egyptian oasis. There, in order to estimate the time, the natives turn themselves into a sort of human sundial, and by means of a rather complicated table are then able to estimate the time of day. I think that is a rather more primitive method than the water-clocks which we have had described to-night.

Prof. J. L. MYRES: It is a very great pleasure to have the opportunity of expressing what one feels at hearing this closely packed summary of one section of the valuable work which Mr. Hilton-Simpson has been doing. He has illustrated very clearly the manner in which the gradual shift in intensity of the different factors which go to make the climate of the Aures has affected the vegetation, through the water *régime* in the first place, and through the vegetation and animal life, the shape which the struggle to maintain human societies has taken. He compared some of the types of scenery, which he showed us, with European forms, some with Asiatic forms, and for some, as he indicated, one would have to go quite far away and find parallels from other parts of Africa. One thing which struck me particularly was how the less dry sections of the Aures recall the similarly constructed parts of the Spanish peninsula, particularly in the north, and even some of the most completely dried-up and vegetation-less

scenes recall Apennine Italy, if you only think back the vanished vegetation, think back the olives, think back the pines on the hills. One has heard it said that Africa begins at the Pyrenees. Mr. Hilton-Simpson has given us a companion picture of a time when Europe stopped at the Sahara. He has been dealing with a region exposed to large climatic variations ; yet even as far south as this one sees how the moderating influence of the Mediterranean climate penetrates an inland region of this upland " Africa Minor."

In what he has told us of the human population and their curious picturesque ways, Mr. Hilton-Simpson has illustrated very clearly some of the main phases through which these people have passed during the long period through which we are beginning to trace their history. He has shown us the Arab incursion in post-Roman time, and indicated how Arab language, religion, and some Arab customs have penetrated into the heart of the Shawiya. Then he has given us illustrations of the way in which, before that, the culture of ancient Rome and Italy, their opposite neighbour across one of the narrowest sections of the Mediterranean, joined hands with pre-Roman culture and created that oil-using, corn-growing, Mediterranean type of food-quest which survives to-day, in spite of all that the Arab pastoralism has done to derange it. Those oil-presses which he has illustrated offer a curious problem, because here we get, alongside of the fully developed type common to Roman Algeria, Roman Tunis, Roman Tripoli, and the other sides of the Mediterranean world, a much more primitive process and equipment, which may be older, but may perhaps result from long degeneration during the Arab period. The native type of oil-press, by the way, is not Roman in origin but belongs to the Greek culture, and was introduced into Italy and the West from Greek lands. One finds it illustrated in Italy itself in a very beautiful little fresco from the " House of the Vettii " at Pompeii, with cupids performing various agricultural operations and adding their infant weight to the oil-press by standing on the end of the long beam.

Mr. Hilton-Simpson said he is not a physical anthropologist, but he has given glimpses of one of the greatest human problems of this region, the puzzle of the fair hair and blue eyes which occur still among these peoples. But the work to which he has devoted himself, and in which he has been so exceptionally aided by Mrs. Hilton-Simpson, has been the study of the surviving elements of the older local culture. In particular, his observations on the industries, on the textiles, and on the pottery are of the first importance as giving us what I would call a very appropriate reconstruction of a phase of life which otherwise we have to collect pictorially and fragmentarily from archæological evidence buried around the shores of the Mediterranean world. That pottery finds its parallel in a few local schools, some rather more elaborate, in other parts of northern Africa, but for its interpretation you have to go very far back, to the industries of Sicily and Spain, in the earliest period of the Bronze Age. I am sure we all of us feel what we owe to Mr. and Mrs. Hilton-Simpson for realling this old world in this observant and sympathetic way—worthy successors, in old Libya, to the greatest of ancient travellers, Herodotus.

Mr. HENRY BALFOUR : I am very glad to have this opportunity of expressing in public the very high appreciation which we feel in Oxford of the work which Mr. Hilton-Simpson has been doing. He went out as a research student after having taken the Diploma in Anthropology, but more or less as an unknown quantity. Nevertheless those of us who had been partly responsible for his instruction felt every confidence in him, and that confidence has been more than justified by the results. Mr. Hilton-Simpson has certain qualities

which are invaluable to those who study native peoples in a more or less primitive condition of culture. He certainly has tact, which enabled him to prevail upon the French authorities to give him every facility, and also has a capacity for winning the confidence of the natives, which is of prime importance to the researcher. He exhibits a sympathy with the native point of view, without which I do not think that anybody can penetrate the native mind satisfactorily; and as a result of these qualities we have been given a very interesting picture of a very interesting people. When I say that the Shawiya are very interesting, I am sure you will agree with me, but I wish to urge one thing. I would like very much to persuade the French authorities in Algeria to delay the penetration of the Shawiya hills with well-made roads and other means of communication. These people are intensely instructive as they are. Will they continue to be so after intimate contact with civilization? When motor cars have raced through their country, will they even be as *happy* as they are to-day? Is there not a great risk they will become spoilt and sink down to a humdrum level of *quasi*-civilization? If I thought I were in order I would move a motion that the Royal Geographical Society approach the French authorities with a view to preserving the Aures massif as a reservation for ethnological study, at any rate for the next forty or fifty years. As has been well shown to-night, if you want to study classics you must go there to find illustrations and explanations. We have had several instances brought before us to-night showing how these people are maintaining customs and habits which were written about by Herodotus, Sallust, and others, and to see these practices still persisting means that we can study them in a living form, and by arguing from the known to the unknown can explain passages in the classics which otherwise might remain obscure.

The PRESIDENT: Mr. Hilton-Simpson has emphasized the importance of studying the country before it gets "spoilt" by railway and civilization, and while we are still able to see the people in their own natural state. I entirely agree; and I hope that others as well equipped as he was and as sympathetically disposed towards the people may go there before it is too late and bring us back accounts of the country and its inhabitants as they now are. I hope also future travellers may have as useful helps as Mrs. Hilton-Simpson. We would wish to convey to them both our warmest thanks for the useful contribution they have given to us this evening. We would also wish to thank the French Government for the help they so generously gave these British travellers.

THE NICOBAR ISLANDS

H. S. Montgomerie

THE Nicobar Islands form an archipelago of twelve inhabited and nine uninhabited islands lying between Sumatra and the Andamans. They straggle over a length of 163 miles, the northern end being 75 miles from the Little Andaman, and the southern end 91 miles from Sumatra. They are therefore in practice only reached by vessels of fair size and power; and consequently they have, till fairly recent times, had comparatively little intercourse with the outer world. Owing to this they have been able to evolve a civilization of their own of an effective if primitive

type, without undergoing much influence from more highly civilized races.

They are mentioned from time to time by writers from Ptolemy onwards; a legend of the natives having tails is persistent.

As early as 1688 mention is made of efforts to convert natives to Christianity, which continued off and on till the Danes took possession and encouraged the foundation of a Moravian Mission. The Danes (and for a short time the Austrians) tried their hands at it with poor results. They formally abandoned the islands in 1848, though for a long time before that their sovereignty had been nominal. The Austrians and the Prussians had schemes for exploiting the islands; but these came to nothing, and the islands were for practical purposes masterless.

These islands were noted for the number of ships lost in the neighbourhood. For long it was supposed that gales and cyclones were the cause; but at last it was discovered that during this masterless period the islands in the Nancowry group were the haunt of a gang of pirates. Naturally these people left inadequate records of their doings; but they seem to have been led by a deserter from the British Navy, who, with a gang probably composed partly of Malays, was able to dominate the natives. This deserter (one Worthington), who began work in the early part of the nineteenth century, not only operated successfully for years, but left behind him a school to carry on his traditions after he had gone. One reason why they were never suspected was that they had no ships of their own; and so the piratical schooner of schoolboy lore did not attract the suspicions of the Navy. Their *modus operandi* seems to have been to wait till vessels entered a harbour (usually the splendid harbour of Nancowry), get on board as peaceful traders or inhabitants, and presently massacre the whole crew, and plunder and scuttle the ships. Landing parties could be dealt with separately.

It is easy to see that, provided they never attacked a ship that was too vigilant or too strong, and never allowed a witness to escape, they might never even be suspected. Possibly on Mr. Worthington's retiring from business his successors relaxed some of his precautions, for on several occasions there were survivors who got off and lived to tell the tale. At last the British, in 1869, formally took possession. For nineteen years they kept up a penal settlement in Nancowry, but in 1888 they abandoned it. During that time a Chinese colony was tried, but failed. Since then the yoke of British sovereignty has been of the lightest.

The result of the British occupation seems not merely to have stopped the piracy, but to have shown that it was foreign to the Nicobarese, who are very peaceful and friendly; the only ferocity remaining is the ceremonial murder of persons supposed to be dangerous to society in some way, such as being possessed by spirits, practising the black arts, or, if a doctor, failing to cure patients as promised. The unfortunate victim usually had his arms and legs dislocated prior to his strangulation, so that

the spirit should not have an effective body to use. Even these murders became rarer as time went on, though one took place in the latter part of 1917.

It is probable that the leading pirates were interlopers and that the natives were merely more or less helpless tools in their hands, especially as they have very poor weapons and not much idea of using them.

The Nicobars are extremely interesting to students of Zoology, Botany, Ethnology, and other sciences, but it is not possible to go into those subjects here.

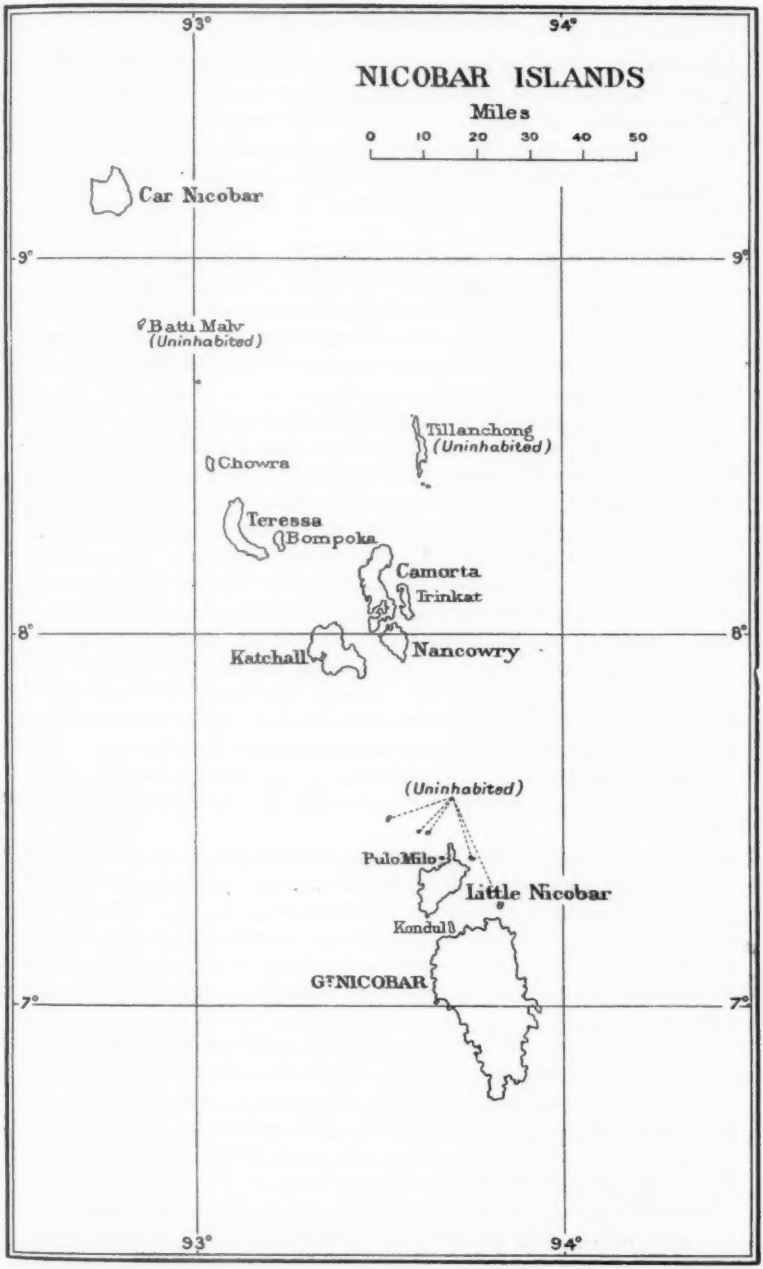
The most interesting aspect of the Nicobars seems to be the manner in which the natives have adapted their lives to their circumstances. It is, of course, difficult to give exact descriptions of the lives of people who, in general, not only do not understand one, but on every subject have ideas radically different from one's own; and mistakes are easily made. But the population concerned is only about eight thousand. They are largely homogeneous, and their civilization, though effective enough, is free from the complexity which makes any real knowledge of India almost impossible.

The group is under the British Chief Commissioner of the Andamans and Nicobars. There are two Government Agencies maintained, one at Car Nicobar and one at Camorta (Nancowry). The Agents collect fees from ships for licences to trade (the only forms of taxation), give clearances to ships, prevent the smuggling of liquor and guns, adjust disputes between natives and traders, and report unusual occurrences, but interfere very little with the transactions between the natives. The Agents are supervised immediately by the officers under the Chief Commissioner and ultimately by the Chief Commissioner himself.

The bulk of the local government, if one may so call it, is done by the native headmen of the different villages (the village and not the island is the unit). These chiefs are in practice chosen by the natives, are assisted by one or two elders, and save for gross misconduct are not removed.

As long as all goes well the Nicobarese therefore are hardly conscious of the British rule. It protects them from any other nations, it is true, but they scarcely realize the fact. As the licence tax is paid by the traders, the Nicobarese are equally unaware of that, and the prohibition against importing firearms or firewater also seems to weigh more heavily on the traders than on the natives. The natives are therefore enabled to "live their own lives" to an extent not always possible in a low state of civilization, and they certainly seem to have adapted their lives to their environment in a wonderful way. I do not propose to do more than allude to their individual or family habits, but rather to consider them as a group of small polities all included in the same economic system.

The islands themselves, though they straggle over 163 miles, are not cut off one from another by stretches of sea as long as that between Sumatra and the southernmost, or that between the Andamans and the


NICOBAR ISLANDS
Miles
0 10 20 30 40 50
93°
94°
9°
8°
7°
Car Nicobar
Batti Malv
(Uninhabited)
Tillanchong
(Uninhabited)
Chowra
Teressa
Bompoka
Camorta
Trinkat
Katchall
Nancowry
(Uninhabited)
PuloMilo
Little Nicobar
Kondul
GtNICOBAR

northernmost. This means that a good deal of inter-communication between the islands is possible, and is far easier to the natives than communication with the outer world. They can use their canoes for their home trade, while for trade with the outer world they have to depend on foreign ships. This makes a sharp distinction between inter-island and foreign trade which enables us to deal with the two trades separately.

The canoe is the dominant agent; all the canoes have a common origin, and do not vary from island to island. Among themselves they differ in little but size. They are dug-outs of very slender and graceful proportions about eight, nine, or ten beams long, very gradually tapered on lines rather resembling those of a Thames racing boat. Nothing but wood is used in their construction.

They are light to paddle with beautiful single-bladed paddles, though at times you may see one rowed with oars. The movement is easy and pleasing; they can with ease be hauled up on a beach; they seldom leak, and can stand a good deal of bumping. Their low free-board matters little to a native who has not much clothing to wet, and if a canoe ships water it holds so little that baling out is easy. Even if by chance overturned in surf it can be righted and baled out, and its power of living in waves has to be seen to be believed. It is too shallow to go to windward well, though probably with a lee-board it would do well enough; but, as the prevailing weather gives a "soldier's wind" along the length of the group, this perhaps matters little. All the Nicobarese, save one tribe, have great skill in their use of the canoes. The sails are nowadays usually lateen sails of cotton, though at one time leaf sails were used.

The Nicobarese are as light skinned as the Burmese and are very intelligent, picking up languages with ease, and having a great facility for figures.

In the northern island, Car Nicobar, each village has a second chief, but as we go further south it is more common to find one chief having more than one village, with no second chief, though one chief one village is the usual rule. The idea of an island as a political unit seems to be little developed, though the structure and position of the islands has had its effect upon their development, as each island is in a different economic position.

Car Nicobar is a flat coral-fringed island, tropical in appearance, with a deep fringe of coconut palms. Chowra is somewhat like it, but much smaller, with a conspicuous hill on the south end not unlike the Scuir of Eigg; both are surfbeaten and offer only open roadsteads. The islands to the south are more hilly and jungly, but on the middle islands there is much green grass, giving them a cultivated look.

Nancowry has by far the best harbour, protected by four islands; the rest have merely fairly sheltered open roadsteads, which confined older efforts at settlement to the central group. Possibly this helps to explain

their failure. The islands tend to increase in size towards the south; the people are not only more numerous but more intelligent as you go north.

Population and acreage were at the Census of 1911:

	Population.	*Area in sq. miles.*	*Density per sq. mile.*
1. Car Nicobar	5794	49	118
2. Chowra	348	3	116
3. Teressa and Bompoka	692	38	18
4. Central group of four	1231	145	8·5
5. Southern group Great and Little Nicobar (less Shompen)	272	170	1·6
6. Shompen (estimated)	375	222	1·7

In 1911 in the north the population was increasing, in the centre stationary, and in the south perhaps even slowly declining. A different dialect is used in each of the six groups.

The foreign trade is carried out on a basis of exchange of which the coconut is both the unit of calculation and by far the most important staple of export. There is some export of birds'-nest, split cane, areca nut, sea-slugs, ambergris, tortoiseshell, parrots, monkeys, etc., but these are trifling in amount compared with the coconut. The imports are chiefly articles of luxury, or, at the best, articles which could be replaced by local substitutes. Dahs (Burmese choppers) and iron generally are useful; but for the rest pottery, wooden boxes, tobacco, nets, sail-cloth, and the like merely replace local products, while ornaments of glass or silverware, beads, salts, castor-oil, coloured cloth, and the like are luxuries. Firearms and firewater are forbidden; matches are appreciated as everywhere in the East; but the art of producing fire by friction is not lost, though I have never heard of a burning glass being used.

From this it will be seen that at present the islands are by no means dependent on foreign trade. This has probably sprung up entirely since the British annexation, as before that the activities of Mr. Worthington and his myrmidons acted as a strong deterrent. The foreign trade seems to be in the hands of Asiatics: Indians from as far west as Cutch, Burmans, Malayans, and Chinese.

One would look first for the trade at the magnificent harbour of Nancowry, but it is not to be found there. The four islands round it are thinly populated and produce little, while coconuts, like the population, seem more numerous as one goes north. Not only that, but the retentive Eastern mind seems to retain dim memories of Mr. Worthington's friends, for even in the four islands Asiatic trading vessels seem to prefer an open roadstead under the lee of the land, whence, if need arose, they could escape with ease. Nancowry would not always be easy to leave, especially at night.

The total annual export of coconuts is thought to be about 6,000,000,

of which more than half comes from Car Nicobar with its 5000 odd inhabitants and thick coconut groves. Chowra has few attractions for the trader, as the great density of population compared with the number of trees means that the nuts are not more than sufficient for local consumption; while the lack of good water, the surliness of the inhabitants, and the absence of good anchorage tend to discourage foreign trade; besides, as we shall see presently, Chowra has other objects for its energies. Teressa and Bompoka produce a good many coconuts. As one goes south the supply dwindles to a very small amount. At Car Nicobar the trade has warranted the setting up of shops or small "factories" by the traders, and developments may be awaited with interest.

The system seems to be for the foreign trader and the native to agree what articles shall be exchanged for so many coconuts. The natives own the coconuts as individuals, and not in common, and so the bargains have to be made with individuals. In most of the islands the articles are then handed over, and the trader gets not the nuts but a licence to remove the nuts. He must collect them and carry them away for himself. If he wants to make the copra and take that away, he must make his own arrangements, and the same with the husks should he require them.

The progressive Car Nicobar folk, however, have reached the stage in which it is usual for the owner to have the nuts cut down and delivered at the stores, and the island even furnishes some labour for these purposes in other islands. In Car Nicobar also the natives build the huts for the traders.

The Nicobarese have no money as such. They like silver and other metals. The rupee is a foreign coin with which they are familiar, and they will buy it with their own currency—the coconut—which is their standard, thus inverting the usual relations of coined money and coconuts. The value of the rupee varies. In theory it was considered to equal 64 nuts, and at one time this may have been so, but it seems that 48 nuts are now more nearly equivalent to it. It is felt, however, that the natives are not getting the real value of their nuts, as they may have to receive cloth, etc., which they do not want, and which will be largely wasted. Although they are not stupid, many of them are not a match for the wily traders whose wits are sharpened by the Asiatic bazaars. The authorities therefore are trying tentatively to introduce money as currency; but this is covertly opposed by the traders, who find it much easier to supervise their factories when the currency is coconuts than when it is coin.

It is of course impossible to arrive at exact figures, but those of 1893 census tend to show that of the 6,000,000 nuts sold only 1,000,000 nuts went for what may be called necessaries, viz. cutting instruments (such as dahs), iron, cloth for use, tobacco, rope, and rice. The rest went for coloured cloth, glass bottles, beads, etc., and other things, most of

which would not be used: almost all the coloured cloth (the largest item) would simply be destroyed at the next death feast. Even for the necessary things, the natives are not really dependent. Their bark and leaf clothes, such as they are, have suited them for ages. Their leaf sails will do, though certainly the cloth sails are better. The rattan canes do most of the work of ropes well enough. They can and do grow tobacco and rice. As for iron it is certainly nice to get dahs ready-made, but if the supply were cut off it could perhaps be dispensed with (though with difficulty). The quantity of iron needed is not very great, though a dah is a necessity of life. Almost the only other objects requiring iron are spear and arrow points, and it should not take much iron to supply 7000 or 8000 people with choppers and heads for spears and arrows. In Worthington's time the iron on board the ships scuttled was probably more than enough; and perhaps even the legitimate wrecks would more than suffice, as the natives can work iron by heat though they cannot make it from ores. For instance, the chain and anchor of a two-hundred-ton boat should go a long way in making choppers and spear points for 8000 inhabitants, and in any respectable wreck there should be much more iron.

From this it will be seen that the Nicobarese are not really dependent on the foreign trade, but are in the happy position of satisfying their own needs themselves and obtaining their luxuries by the process of getting the trader to pay them royalties for leave to collect their nuts. Their only contribution is planting trees and fencing them in when young, though, where necessary, those of them who are not capitalists can hire their labour out to the traders. Therefore, even if they do not get the full value in luxuries from these royalties, they are still better off than the majority of the human race who have to work for both necessities and luxuries.

When we come to the inter-island trade, a curious state of things is revealed. The islands, which we are apt to look on as homogeneous, are in reality nothing of the sort; each group seems to be dependent on one or more of the others for some of the necessities of life, as the products of each group differ. A little examination reveals threads of trade, tiny but vital to the system, and running in the strangest directions.

One of the most interesting of the islands is Chowra, with its dense population of 116 per square mile. The fact that it has no surplus coconuts or fresh water, the absence of a good harbour, and the surliness of its natives cause it to be neglected by and to stand, as it were, sullenly aloof from the foreign trade. It is, however, the head of the inter-island trade, as Car Nicobar is of the foreign trade, and has an importance out of all proportion to its size or even its numbers.

Chowra is looked upon by all the rest of the islands with a good deal of awe. It is considered to be the cradle and birthplace of the race, almost the holy land of the Nicobarese, and its inhabitants in general are

(like the Lapps) believed to be wizards. They had a good supply of clay on the island of Chowra, and have a practical monopoly of pottery, made by their women, who have hereditary skill. The monopoly is doubtless due chiefly to skill, but partly to a kind of tabu which discourages the making of pots elsewhere. The Chowra clay has come almost to an end in the last few years, but they still retain the monopoly, getting the raw clay from Teressa.

The Chowra folk also have some skill as blacksmiths in working iron, and, though seemingly they have no monopoly of this, they very likely are more adept than are the natives of many of the other islands.

These things and the aloofness of Chowra from the foreign trade differentiate its natives somewhat from the rest, but their wits seem to have been in no way blunted; in fact, they are sharper than the other islanders, and are not only the manufacturing island but the commercial centre, entrepôt, and exchange of the inter-island trade.

A curious feature is the existence of the Shompen. This race is considerably lower in the scale of civilization than the other Nicobarese, and apparently represents the Nicobarese of a previous epoch, much as if in the centre of England a Mercian kingdom existed to-day with the culture of the Heptarchy.

At some date unknown a tribe or race in Great Nicobar got cooped up in the interior away from the sea. Whether the lower state of civilization caused their being thus circumscribed, or *vice versâ*, the fact is that they are shut off from the sea and are in a low state of civilization. They cannot work iron or make pottery.

It would be interesting to discover the approximate date of their seclusion. It is possible that it had taken place before Dampier's visit there in 1688, as he speaks of the inhabitants living all round the island by the seaside, and adds that there is no clear land further in on the island, for he observed that, when past the fruit trees, there were no paths going into the woods. This would quite fit in with the existence of a hostile tribe in the interior, and, as Dampier (though an observant man) was ignorant of the Nicobar language and not familiar with the people, he might quite well never have even suspected the existence of the Shompen. On the other hand, it is possible that his friends were the Shompen before their seclusion, but that seems less likely for several reasons. His friends were expert canoemen and fishermen, and he saw no difference between them and the natives of the other islands, some of whom came there. They had earthen vessels, which the Shompen have not, though they lute vessels of leaves and bark with clay, showing that they can procure the raw materials. Unless the Shompen were Dampier's natives, and have retrograded owing to their seclusion, it seems more likely that they were already at that date cooped up in the interior.

Their seclusion seems to have prevented their very existence from being recognized till quite lately, and even then it was thought that they

represented an aboriginal race, possibly of negrito origin; but it seems now to be becoming more and more thought that racially they are one with the other Nicobarese, their differences of speech and habits being due to their primitive civilization.

The belief that they are more akin to the Chowra people, and that these and the Shompen belong to a race which, though flourishing in Chowra, was cooped up in the interior of Great Nicobar and wiped out in all the other islands, seems to rest on the fact that Chowra is looked on as the cradle of the race. I see little to support this view. The Chowra people seem as much above the average of the Nicobarese in wits as the Shompen are below it, and philologists, I am told, seem now pretty certain that all the Nicobarese have a common origin.

The Shompen, though cooped up in the interior, have, it is thought, rather been able to turn the tables on the coast tribes of late. Possibly the Shompen have increased relatively in numbers, or have obtained by trade enough iron-pointed spears, etc., to be a match for the coastal Nicobarese. The latter are afraid of the Shompen, who occasionally have attacked a coast village, and the natives of the central islands also express some fear of the Shompen.

The home trade of the Nicobars has grown up naturally from the fact that some islands possess goods which others cannot or do not grow, and that the inhabitants of some islands have what amounts to a monopoly of making certain goods. The trade is all carried out on a basis of coconut currency, though the nuts do not necessarily pass, and are often used merely as an instrument of reckoning and credit. Some of the transactions are barter reckoned on a basis of coconuts. The transactions, however, are not as a rule so simple. It might be necessary first to bargain what the price of one article reckoned in coconuts should be, and then to reckon what other goods required in exchange would have a value equalling that of the first.

Though the Nicobarese have strong individualistic views as to the ownership of coconuts, due weight is given to the claim of those of the rest of the family who have helped to grow them. A kindly custom allows any one going from one place to another to cut down nuts he needs to eat or drink on the spot, and it would be thought very churlish to refuse. This custom is the more valuable since in many places good drinking-water is very scarce. It would, however, be thought in the worst taste to carry any away without payment or to help yourself in the neighbourhood of your own dwelling, where it is supposed you have coconuts of your own. It is also etiquette, should the owner be present, to ask him from which tree he wishes you to help yourself.

The goods produced more or less exclusively by each group are roughly as follows:

Car Nicobar receives the great bulk of the foreign goods and makes baskets.

Chowra makes pottery and ironwork; lime derived from coral; drugs and charms.

Nancowry makes lime (from seashells) used for eating, and large canoes for the longer sea journeys; the northern islands a small quantity of cloth from bark.

Teressa produces tobacco and raw clay.

The southern group makes bark cloth, thin split rattan cane, canoes rather smaller than those made in the Nancowry group.

Shompen produces best rattan canes, bark cloth, wooden spears, matting, honey, and half-made canoes.

The bulk of the home trade seems to be in the hands of the Chowra folk. The stretch from Car Nicobar to Chowra is about as much as canoes can normally do (43 miles); the stretch from Car Nicobar to Teressa (50 miles) would be too great as a rule. The chief wants of the southern group can be supplied from Car Nicobar, and *vice versâ*. Exchanges between islands to the south of Chowra with which the Chowra people could not interfere are much less in volume and value than those between Car Nicobar and the others.

The Chowra people have, for semi-savages, quite good business heads; they can carry out large commercial transactions with ease, having a facility for figures only rivalled by that of the Car Nicobar folk. The Chowra people also boycott all Car Nicobar canoes not bought through them, and so reduce their value. There are not many such, but there is one canoe at least known to have made the long journey from Teressa to Car Nicobar without landing at Chowra, and occasionally a ship which is carrying a native from the central or southern islands to Car Nicobar may allow him to take a canoe on board; but I fancy that if a canoe not bought through Chowra was to go north and call at Chowra with a view to going on to Car Nicobar, its path would not be made easy and some evil would be likely to befall it. Moreover, it would be rigidly boycotted on subsequent visits. This system seems to have the effect of giving the Chowra folk a complete monopoly of the trade of canoe broking.

Even these advantages would perhaps not account for their economic position were it not for their repute as magicians. It is believed all through the islands that great ill luck will follow any attempt to manufacture pottery elsewhere than at Chowra, and the belief that even using such pottery brought ill luck is common, though perhaps dying out. The position of Chowra as an *entrepôt* depends therefore partly, but not wholly, on the Chowra pottery. The Chowra folk are not much liked by the other islanders, partly because of their surly manners and partly because of the belief that as middlemen they exact too high a percentage of profit.

People capable of dealing with figures running into tens of thousands can hardly be thought of as savages. The Chowra folk seem fully alive to their position. On one occasion when they were inclined

to give trouble the authorities threatened to distribute pottery gratis among the customers of Chowra; the probable effect of this dumping was foreseen at once, and no more trouble was caused.

The rattan cane, which is grown chiefly in the southern group, is a necessity for the manufacture and repair of canoes, and is used also for houses and many other purposes. Though some of it goes "foreign," almost every canoe going northward takes a load of it. These rattan canes give the Shompen trade some importance, as the canoes and houses need them, and the canoes are almost as essential as houses. Apparently the Shompen have the best rattan canes, as these seem to be much sought for even for the foreign trade. The Shompen also can half make canoes, which the coast people finish. Bark cloth is another speciality of theirs.

In this trade the coastal Nicobarese act as intermediaries between the Shompen and the outer world, and though we know that they complain of the high charges of the middlemen at Chowra, their own charges are fairly comparable.

The Indian Government protects the islanders from alcohol, as the navy does from outside enemies. They do very little toiling or spinning, and their existence, pleasantly diversified by fishing, hunting, and sea travel, and full of leisure, seems as near that of the lotus-eaters as one can imagine.

This Eden is at times threatened by a serpent which hitherto the Indian Government has warded off. Various persons, thinking how good it would be to have monopolist concessions there, have put forward schemes for large blocks of freehold land and for the exclusive right to buy the nuts. So far all these have been rejected—and rightly. First, it is hard to see why the natives should be denied the right to sell their produce in free market just as other natives of India do, or why the rest of the King's subjects should be denied the right to deal with them. The trading is carried on with very little friction, and to put the island in the grip of a monopoly would be a very retrograde step. Apart from the disadvantages to the external trade of the Nicobars, it is to be feared that the monopoly would upset the ingenious and delicately balanced internal trade. The fabric of this trade is more intricate than appears at first sight, and it is almost certain that the insertion of clumsy or greedy fingers into its fine web would cause a great deal of misery to the islanders.

A grant of land seems equally unfair to the native. In two at least of the islands, with 116 people per square mile, it is out of the question. In the other islands it would work grave injustice. In the undeveloped state of the Nicobars, unquickened by competition, it is hard to arrive at any exact ideas of their views as to the tenure and ownership of land. It would seem that, speaking broadly, the dominant idea of the Nicobars is that of a large tract of land owned in common by the village. Some of this is tilled and some not. The untilled part is common property. If a

tree at some distance from the village, but on its common land, is cut down for a mast, payment would be claimed by the village through its chief. Overlying the communistic idea is the recognition within the village of individual rights in trees planted by a man or family. Absolute individual property, transferable and even heritable, is recognized in such trees and in other property.

It is, of course, possible that in a thinly populated island the rights over a piece of jungle far away from the village might not be jealously guarded; but none the less it would be an invasion of some one's rights to appropriate it. The fiction that all waste land is the property of the Crown is quite foreign to the Nicobarese, who if they could formulate their ideas, would be most likely to consider all the land as allodial land held by some village or other in common, subject to rights of individuals and families over trees planted by them or their predecessors, and over huts, vegetable gardens, etc. Perhaps the nearest approach we could have to a parallel case would be that of the waste land of a manor in which the custom of the manor allowed the lord or any commoner to plant trees for his exclusive use in any part of it, but where no stranger had any rights save by courtesy.

Perhaps substitution of coin for nuts as a standard of exchange is inevitable, as once the Nicobarese learn the purchasing power and indestructibility of coins, they will be far more able to make good bargains, and will not be tempted to buy rolls of cloth only to destroy them again at once. The division of the rupee into annas and pies might trouble them at first, but not for long. At present one nut buys about 4 pies, not long ago it was 3 pies, and if the Nicobarese could be got to think in pies the conversion to annas and rupees would come soon enough.

The Nicobarese systems of arithmetic are very curious. In the first place, all the record is by notches cut in a stick or occasionally by beads on a string. It is convenient to call the former system tallying, but in fact I have not come across any cases of the tally proper where the notched stick is split lengthways so as to give each party a record. Secondly, they have two main systems, one (A) for ordinary objects, and another (B) for the unit of currency the coconut. This we might liken to old-fashioned shepherds who would count their sheep by a special system of notation based on the score, but would count money in the usual way.

Thirdly, each group has its own notation in each system, though in each island the notations of the islands with which it deals direct are understood.

In the system for ordinary objects, each of the six groups has a slightly different form of notation ranging, as one would expect, from the simplest in the case of the Shompen to the most ample, that of Car Nicobar. The Shompen dialect does not cater for more than 600, the other dialects stop at 700, and Car Nicobar at 2000. Larger numbers in practice are not wanted. All the dialects have special words up to 10, thence by various

compounds to 1 score, thence by multiples of 1 score to 1 score of scores = 400; above that go the slightly more elaborate systems ending in Nicobar's 5 score scores = 2000. The differences between the six systems are not very marked.

In the system for coconuts as a unit of currency, complexity of notation varies as the amount of foreign or coasting trade. The Shompen, with no foreign trade and no inland trade save through the Nicobarese on the coast, use their ordinary system applied to pairs. One score = 20, 1 teo = 1 score of scores = 400; and they are easily able to grasp 10 score of teo = 80,000. The other groups have each different scales, some of which are alternative, so as to allow of intertrade, each pair of islands having at least one system in common. The scales vary in complexity, as do the trades of the different groups, culminating of course in Chowra and Car Nicobar, the centres of the coasting and foreign trades respectively. Car Nicobar and Chowra have each six standards, Teressa four, the central and southern three and the Shompen one.

For example, Car Nicobar, whose trade, though no more complicated than that of Chowra, runs to larger figures and deals more with the outer world, has a system:

10 pairs	= 1 score =	20
10 score	= 1 ong =	200
10 ong	= 1 kaine =	2,000
10 kaine	= 1 lak =	20,000

This system is usually described as dealing with scores, but that is misleading. They seem for this purpose to think of nuts in pairs as we think of pairs of boots or so many brace of pheasants. The nuts are usually carried in pairs for the sake of convenience, and I think that if you got a man to carry one nut for you he would promptly get another and loop the two together for his convenience. The unit numbers in some of the dialects run in pairs, 2 pair is four, 3 pair six, etc., and the Shompen use $\frac{1}{2}$ a pair for one and "$\frac{1}{2}$ a pair ten" for eleven. Again, the lak (clearly picked up from traders) is really 10,000, but the Car Nicobar people mean by it 10,000 pair = 20,000 nuts, and any trader thinking in pairs will have no difficulty.

In other ways, too, the Nicobarese show an aptitude for matters more or less connected with mathematics. They understand the points of the compass thoroughly, and have observed the southing and northing of the sun, which they attribute to its having been blown out of its course by the south-west and north-east winds which prevail in the summer and winter respectively, a more rational theory than many which have been put forward.

They count the days of the month in various ways, but all recognize four periods—dark, waxing, light, and waning. A month "tally" or calendar now in my possession is in the shape of a dah as used by the Nicobarese;

it has 30 holes, 4 for the dark, 10 for the waxing, 6 for the bright, and 10 for the waning moon. A peg is provided which they move on day by day. They do not think of solar years, but only of lunar months and monsoons. The monsoons roughly are May–October (rainy) and November–April (dry), but are not exact to time. This enables a fresh start to be made at the beginning of each monsoon, so that the difference between their months of 30 days and the true lunar month of about 12 hours less does not accumulate much, the first moon in each monsoon being cut short so as to start right.

By these means the Nicobarese can foretell the state of the moon and the tides with sufficient accuracy for some time ahead. The power is very useful to them in arranging their long canoe voyages, as not only is the state of the moon important, but neap tides are very desirable. They know the pole star and the Southern Cross, but navigation by the heavenly bodies is thought to be wizard's work, and the young men prefer to leave it to the old men. All this knowledge is strictly practical and directed largely to the management of the canoe.

Even with this the long passages made by such tiny boats would be almost impossible were it not for certain physical facts. The islands are in a long chain running about N.N.W. and S.S.E. The prevailing winds are more or less S.W. and N.E., and usually provide a soldier's wind for a boat sailing along the group. The pole star and the Southern Cross are not so far out of the course that a boat cannot steer by them. The moon and the sun in these latitudes give a good idea of east and west when within three hours of rising and setting, and the periods of cloudy weather can as a rule be known long beforehand.

The canoes have, it is true, nothing to fear from shallow water, and even if they upset can be righted; but the soundings—often over 100 and sometimes 500 fathom—can give them no help, and the chart marks tides of 5 knots in places.

THE MOUNT EVEREST EXPEDITION

WITH the arrival of Colonel Howard-Bury in England on December 13 the first year's expedition is ended; and its members are to give a preliminary account of their work on December 20 at the Queen's Hall. These reports, with maps and photogravure illustrations, will be published in the *Journal* for February. A more complete narrative will be published for the Mount Everest Committee as early as possible in the spring by Mr. Edward Arnold. An exhibition of photographs from the expedition will be held in the Hall of the Alpine Club from January 9 to 28 inclusive. And a series of lectures in the principal cities of the country will be given on behalf of the Committee by Mr. Mallory during January and February.

The collections made by Mr. Wollaston came home with Mr. Raeburn on the *Delta* and were delivered at the Society's house on December 1, after some delay in the remarkable fog of that week. The birds, animals, and insects are being examined and named at the Natural History Museum. The Director of the Royal Gardens at Kew has already determined the greater part of the large collection of plants, and under his direction the flower seeds of many species have been distributed to subscribers for shares, to the Royal Gardens at Kew and Edinburgh, and to several specialists.

With the collections came a very fine series of negatives on glass taken with the principal cameras of the expedition; up to that time only films had been received by post. Some very fine enlargements from the latter have been shown at the Alpine Club's winter exhibition during the month: a much larger and finer series, especially from the glass plates, will be exhibited at the Alpine Club Hall in January; and in course of time a portfolio of the best will be put on sale.

The members of the expedition have received on their return the sincere congratulations of all those qualified to appreciate their success. The only discordant note comes from India, where certain newspapers, ill-informed, and perhaps ill-disposed, have written down the expedition as something of a failure, and put an absurdly wrong construction on the change of leadership for the second year. Modern facilities of communication, used recklessly, can thus cause great temporary disappointment and annoyance to the most successful of men, arriving weary from a long and exhausting expedition.

The necessity of a much earlier start next year, with a climbing party strong enough to conquer on the relatively easy yet terribly arduous route to the summit, has given much work to the Committee; but preparations are already well advanced. The expedition under General Bruce's leadership will include eight other climbers, a medical officer, a photographic officer, and a painter. Of the first year's party only Mr. Mallory from England and Major Morshead from the Survey of India will go again. Lieut.-Col. E. L. Strutt, D.S.O., will be second-in-command. Mr. George Finch and Mr. T. Howard Somervell have been already selected for the climbing party, and Capt. J. B. L. Noel will be photographic officer. The names of the rest will be announced shortly. General Bruce leaves for Darjeeling early in the new year; the main party about March 1, and by the end of March the whole expedition should be in the Chumbi Valley on the way to their base in Tibet.

NOTES ON THE SEASONS IN EQUATORIAL AFRICA

F. W. H. Migeod

I LEFT England towards the end of 1919 on an expedition across Africa, my intention being to keep as near to the equator as I reasonably could without very great difficulty.

Whilst still on my way down the coast to Libreville in Gabon, where my overland journey was to begin, I had expected to find the dry season by the beginning of January, as I was still in the northern hemisphere. Instead of that there was heavy rain, which continued all through January; and rain in that month is a feature of the southern hemisphere. It seemed as if here on the western side of the continent there was a tendency for the southern seasons to intrude on the territory of the northern, and push the latter back, actually displacing them. For a certain number of degrees of latitude, therefore, the seasons were the opposite of what they should be, and it was only at the northern limit of this invasion that the normality prevailed which should have been found on the equator itself.

I studied this feature at every halting-place during the whole of my journey, which lasted eleven months, until I reached the Indian Ocean. Where there were no available statistics I took the opinions of local residents. The bulk of the information seems to show that for the greater part of the length of the equator the superior strength of the southern seasons is clearly noticeable. The area covered was wide enough to eliminate local disturbing influences. Even if the latter did produce some modification, it did not seem to be enough to affect the general principle.

I obtained good information in regard to Libreville, my starting place. This town, which is in lat. 0° 25′ N., should have the January dry season fairly well marked. An average, however, of three years gives the period December to March as very wet; and it certainly rained very hard whilst I was there in January. On the other hand, June and July are practically dry. This, I think, can only indicate that Libreville is under the southern influence. The same applies to Principe Island in lat. 1° 50′ N. The rain falls there between September and March, tornadoes only being expected during the rest of the year. At the western end of the equatorial zone, therefore, the limit of the invading southern seasons may be placed well to the northward of the geographical equator. To place it near two degrees north might, in the absence of further information from the neighbourhood, not be to place it too far.

Leaving Libreville, the first place I stopped at was Kango, at the head of the Gabon estuary, about 60 miles direct from the coast and roughly on the same latitude as Libreville. Here I was informed that from May to October there are all the features of the southern dry

season. It is dry, cloudy, and windy. In January and part of February there is also a small dry season. Its tendency should be, if not exactly equal, a little stronger than the mid-year dry season, for Kango is not south of the equator. On the contrary, it is small both in duration and force compared with the southern influence. Further inland, at Bue, which lies on the Ogowe river, and is almost exactly on the equator, June to October is called the Big dry season, and January and February the Small dry season. There is thus no idea locally of an even balance between the two. To the north-east of Bue is Makoku, in lat. 0° 35′ N. Here also the Small dry season is at the beginning of the year, and the Big dry season in the middle of the year. At Etumbi, on the Likuala river, practically on the equator as far as has been ascertained, and in about long. 15° E., the July dry season is bigger than the January one.

A short distance east and on the same river is Makwa. This place is precisely on the equator. Here I saw official records covering just over a year. Rain fell in every month of the year, but was rather heavier in the months at the beginning of the year than the mid-year months, which clearly shows the overbalance to the north of the southern seasonal influence. As far as French territory is concerned, therefore, the line of the preponderance of the southern seasons seems undoubtedly well to the north of the geographical equator all the way from west to east. At what degree of latitude, however, to place it in the east there is not sufficient information available.

I should have liked to have obtained statistics at Coquilhatville in the Belgian Congo, which is exactly on the equator. General opinion was that the seasons there are irregular. There had not long previously been a drought of seven months. Anyhow, in early June there was a strong south-west wind blowing for half the day, and strongest in the forenoon; so that the southern seasonal influence was certainly not non-existent. There were also occasional tornadoes.

Alberta station, a palm-oil plantation and factory of Messrs. Lever Bros., is on the northerly bend of the Congo, in lat. 2° 10′ N., and about long. 22° 20′ E. There is rain here nearly all the year round, but the northern seasons are shown in the statistics as holding their own, which is as might be expected in so high a latitude. The dry season is from the middle of December to the middle of February, though it is not entirely without rain. The effect of the southern dry season was scarcely noticeable for the one year for which I saw figures. Indeed, rain fell very heavily. It is to be expected that in so high a latitude as is Alberta the northern seasons should predominate, though not to the extent the statistics indicate. I had hoped to find good statistics at Stanleyville, but was informed there were none.

Bafwaboli, in lat. 0° 35′ N., long. 26° 30′ E., is in the midst of the dense forest and on the Chopo river. It rains here in every month of the year, but, as two years' figures show, a trifle less in January and February

than in the mid-year months. Bafwaboli, therefore, gives the same negative results as Alberta. At Avakubi, lat. 1° 20′ N., long. 27° 30′ E., I obtained good statistics. It is on the Ituri river and in dense forest, and rain falls in every month of the year. The January dry season is here slightly stronger than the mid-year dry season, taking an average of years, though in 1917 it was slightly the reverse. At Penge, not a degree to the eastward of Avakubi, I was informed by an old resident, a trader, that he considered the dry season at the beginning of the year the principal one. When eventually I came out of the forest and reached Irumu, still in about the same latitude, 1° 30′ N., I learnt that the January dry season was the more important, but whether its influence was about normal or varied from normality I could not ascertain.

Coming now into Uganda: there seemed to be some uncertainty about the seasons. Both Mount Ruwenzori and Lake Victoria exert considerable local influence, and between the two is a dry belt. I was told at Kampala, which is just north of the equator, that the southern dry season seems to be rather the more influential as a dry season; but I was unable to confirm this precisely from the meteorological reports which I saw, as the figures seemed to indicate nothing very pronounced either way. Anyhow, there seems to be at Kampala a very strong wind in June; and high wind is the normal accompaniment of the southern dry season. At Kisumu, at the north-eastern corner of Lake Victoria, in lat. 0° 7′ S., there is rain all the year round, and it is difficult to form any clear deduction without having the figures for a long period of years. At the observation station of Kabete, near Nairobi, in 1° 17′ S., the mid-year dry season seems stronger. This, however, is no more than it should be from the position. The same feature is shown by one year's figures at Fort Hall, which lies in a north-easterly direction from Nairobi, and in lat. 0° 43′ S. There almost seems to be a tendency at these two places for the northern seasonal influence completely to hold back the southern, but whether the balance is at the equator or even just below it, there is not sufficient to decide. Nevertheless the total reversal of the conditions that prevail on the west coast is seen at Mombasa. Although this place is as far south as 4° 4′ S., it has the cool northern dry season, and generally it seems to have a climate of its own that does not harmonize at all with general conditions.

The southern seasonal overbalance, therefore, which, west of the Congo river, is so far to the north, is less conspicuously so when that river is reached and passed after it has cut the equator. After leaving Kisumu the overbalance is completely lost, and when the east coast is reached there is a total reversal, and the northern influence powerfully pushes back the southern seasons.

As the seasons follow the vertical sun in the tropics, some reason must be sought for these variations, which from their magnitude cannot well be classed as purely due to local causes. The eight days' longer

sojourn of the sun in the northern hemisphere may be one. Another may be the preponderating mass of water compared with land in the southern hemisphere. Should it be either of these causes, or both acting together, then the disturbing tendency as seen in East Africa may be due to the Sahara desert. This desert from its extreme western limit near Cape Verde trends eastward with a slight southerly dip until it crosses the Nile. Thence the dip is nearly entirely south-easterly, until eventually the southern edge of the sand comes to the south of the equator. It must undoubtedly be the desert, with the special winds it sets up, which accounts for the exceptional climate of Mombasa.

In examining this subject it must of course be borne in mind that it is not the actual quantity of rain that falls which governs the situation, but the relative quantity. A rainy season may be well defined though the rainfall be small. The same holds good in the reverse way with the dry seasons. I know of places in close proximity to one another with very different quantities of rainfall. In one I recall in another part of Africa the dry seasons and rainy seasons were very clearly distinguished. Yet 30 miles away in a straight line to the northward, and with only a few hundred feet rise, there were only rainy and wet seasons, the enormous precipitation almost swamping the dry tendency. Nevertheless these two places have the same relative proportion as regards the opposite seasons.

GEOGRAPHY AND HISTORICAL GEOGRAPHY

The Geography of the Ozark Highland of Missouri.— Dr. Carl Sauer. University of Chicago Press. 1920. Pp. xviii. + 246. *Price* 3 *dollars.*

DR. CARL SAUER, of the University of Michigan, has recently written a very interesting monograph which has a twofold purpose: "To furnish an adequate explanation of the conditions of life in a given area, and to contribute proved statements which will aid in working out fundamental principles." The purpose is admirably accomplished and the study is a notable contribution to geographical science, but the inclusion of an account of the settlement and development of the region raises the question of the scope and aims of Geography and Historical Geography respectively, and at the same time supplies material to illustrate the relations between these two branches of knowledge.

Geographers seem to be approaching a general agreement about the content of their subject, but it is more difficult to obtain a clear idea of what Historical Geography should include and at what it should aim. Dr. Sauer seems to the present writer to be quite clear about the relations between Geology and Geography, but to include as Geography much that is appropriate only to Historical Geography.

In the selection and explanation of the facts of the physical geography of the Ozark Highlands, Dr. Sauer adopts criteria which may be quoted. "Only those things which are pertinent to an understanding of the conditions under which the people live are introduced. Rock formations are of significance in this connection in so far as they have determined topographic features, soils

and mineral resources, and in so far only. No attempt is made to sketch the physiographic history except as it contributes to the explanation of surface features, drainage conditions and soils. The mineral resources need discussion only in so far as they have been a factor in the development of the region. Whatever is more than this may be of geologic, physiographic, or mineralogic interest, but is not pertinent to geography." This is in complete accord with the view of the present writer that two general principles should be adopted : (1) *As Geography deals with present conditions, the past is only to be evoked when it is necessary to explain the present;* (2) *as the object of Geography is to discover the relations between phenomena, those facts should be left aside which have no appreciable influence upon others.*

In Part I. of his book Dr. Sauer deals with "The Environment." He shows how the situation of the region in the angle between the Missouri and the Mississippi below St. Louis gives it a water front which first led to its settlement and later facilitated the communications of its eastern portions. Its structure is that of a raised peneplain, dissected more completely in the northern and eastern parts adjoining the great rivers than in the south-west ; consequently its northern and eastern borders are rough, the north-eastern interior is hill country, and in the centre and south-west are wide plateaus. By the larger rivers were swampy "bottom-lands," the north-east is naturally wooded country and the upland plateaus have been open prairies since Indian hunters prevented tree growth by fires. The geological structure is complicated, and there is therefore a variety of soils ; minerals are numerous, lead, zinc and iron being the most important.

In Part II. Dr. Sauer discusses the settlement and development of the region, which was colonized by a few French at the beginning of the eighteenth century, followed a century later by the first of the Americans, from whom the bulk of the present population is descended. From about 1830 till after 1850 German immigrants were numerous, and their influence was greater than that of the French settlers. The nature of these settlements and the subsequent developments in the utilization of the resources of the region are explained at length, and occupy nearly one-half of the volume.

In Part III. present economic conditions are described, the influence of environment upon the mental characteristics of the people is examined, and it is pointed out how the region may be further developed.

The book is a really valuable piece of work, but we would question whether the greater portion of Part II., dealing with the early settlements and development, should not be excised from a geographical study, though it might well be used as material for a study in Historical Geography with a different object in view. If the business of Geography is to study the inter-relations of present conditions much of the information about earlier times is irrelevant, and just as Dr. Sauer excludes "physiographic history except as it contributes to the explanation of surface features . . ." so we consider much of the economic history should be excluded. The principle that the past should be evoked only to explain the present applies to human as much as to physical conditions.

As a case of geographical influence of past times which has no appreciable bearing upon the present we may quote the following passage: "One of the more notable things about the early locations is the large number of small entries which were made on creeks before the much superior bottom-land on the larger streams was occupied, except in the Missouri valley, and also before the smooth upland was taken. Except in the case of the very best lands, the pioneer used different standards than are employed to-day by which to judge

the merits of a location. These small homesteads on the 'branches' were almost invariably at a spring, and this was the first consideration in their selection. Timber and stone were to be had near by for buildings and fences. . . . Many of the early settlers were more hunters than farmers. . . . These settlers needed neither much land nor fertile land." This is not strictly Geography, it is more than History; it is the Geography of the past: Historical Geography.

With it may be contrasted Dr. Sauer's account of certain features of the German immigration which have an appreciable influence upon present conditions. For example, the Germans introduced the cultivation of the vine into the northern counties, so like the Rhine Massif; moreover, they were accustomed to the growing of "small grains" (as distinct from maize), and to-day the heavy production of wheat in the Missouri portion is due in large measure to the predominance of German farmers.

Geography should deal with present conditions and their causes, and to Historical Geography should be relegated the inter-relations between man and his environment in the past. The subject is evidently of such great extent that unless it is to be a mere collection of facts and causations, some unifying principles must be discovered and applied. The obvious course is to adopt a simple chronological arrangement and to trace the history of men in a given region by inquiring at each stage how they were influenced by natural conditions. If this is done it soon becomes apparent that men in the past had not the same environment as at present. The physical conditions have changed, and unless these changes are appreciated the interpretation of the past must be incorrect. The tendency to observe the present environment and to assume its identity with the past is a pitfall against which Historical Geography may issue the clearest of warnings.

Just as there has been an evolution on the human side, so there has been (even during "historical" times) an evolution of the influences which have affected mankind, and to this also a chronological arrangement may be applied. Moreover, not only have the physical conditions affected man, but man has modified his environment. It is therefore suggested that a useful method of study is to consider the environment in the first place, and note its evolution, and at each stage of its evolution to study its influence upon the human life with which it is inter-related.

In the particular region used here in illustration, human history goes back little more than two centuries and consequently developments in the environment have been relatively slight and the problem is correspondingly simple, as compared with an area in Europe. Changes have, however, occurred. For example, the prairies, through the Indian hunters' fires, lost their characteristics when after the coming of the Americans the cessation of fires caused the grasses to be displaced by the growth of young trees, with a consequent deterioration of grazing and increase of lumbering and crop production. Again, the draining of the bottom-lands led to the disappearance of malaria and an improvement in the physical and mental condition of the inhabitants.

Studying a region in which history goes back farther, one may classify environmental developments in some such way as follows:

(1) Changes in the physical conditions due to natural processes; *e.g.* the coastal alterations caused by sea deposits, or by positive or negative variations of sea-level. These have obviously played a great part in the historical geography of the Netherlands.

(2) Changes due to the intentional or unintentional action of man; *e.g.* the

deforestation of areas, leading to the rapid removal of soil from hillsides and the silting up of river mouths. The Eastern Mediterranean region supplies disastrous examples.

(3) Changes in the relation of one region to others, *e.g.* their mutual accessibility may be increased or diminished and streams of influence opened, dammed or diverted. The closing of the land route to the East and the subsequent discovery of the trans-oceanic lands profoundly affected many parts of Europe, causing the decline of some regions and a more than compensating stimulus to others.

(4) Changes in the utilization of the resources of a region by its inhabitants, arising either from an increase of knowedge and advance in arts and crafts, or from the immigration of a people who may be more, or less, capable of availing themselves of the possibilities of the environment.

An interesting example of the last type of change is appreciated if the present productivity of the prairie lands is contrasted with their inutility to the first comers. Dr. Sauer quotes an early account of the immigrants: "Coming from a woodland country in Tennessee and North Carolina, where they didn't know how to make a field unless they hewed it out of the forest, they would go down on a spring branch and clear three or four acres for a field, which would cost them more labour than it would have done to build a forty-acre field in a prairie." Another writer is quoted who declared of the prairie region between the Ohio and the Mississippi: "A small part only . . . will ever be settled. The scarcity of wood and water furnish insuperable objections to it." In one sense this region has always had its very great potentialities, but for practical purposes they could scarcely be said to exist until those men came who were able to appreciate and make use of them.

The British Isles offer abundant opportunity for a historical geography which should show the evolution of the environment in conjunction with the evolution of the inhabitants. Here only three stages may be selected in illustration. In earliest times grassy uplands, rising island-like from the forests and marshes, were the home of man, and the essential features of the geography of those times were (i) the distribution of these uplands, which controlled tribal relationships, and (ii) their climate, soils and vegetation, which controlled the occupation of the people, whose isolation and mode of life enforced the simplicity and limitations of their thought.

Some centuries later the lowlands of south-eastern England, previously negligible except as barriers, were cleared and drained by peoples who had come across the Narrow Seas. The geography of Mediæval Britain was essentially different from that of Pre-Roman Britain. Agricultural communities closely knit in the township, had their centres largely by the streams, using the grassy heights only for pasturing their sheep and obtaining the greater part of their livelihood from fields and forests. Nature was more generous, the life of the people was fuller, a small surplus made possible the rise of arts and the beginning of learning. The settlements were almost self-sufficing, the national organization had as yet few functions and played little part in the life of the people. Britain was still cut off from the rest of the world, for very little trade joined these islands to Europe, few travellers brought ideas to the larger part of the country, and the greater stimuli came from the occasional warlike incursions into the adjoining part of the continent.

By the nineteeth century, the geography of Britain was again transformed. The discoveries of the use of coal and iron revealed the wealth of north-western England and essentially increased the area of the country, while improvements

in means of communication and maritime discoveries changed the situation of Britain from the margin to the centre of the world of men. The stores of metals and mechanical power were the basis of an enormous growth of wealth and population, which in turn made possible the political power of Britain, so that its relations to the rest of the nations were almost reversed; instead of receiving stimulus, it influenced and indeed in some ways almost controlled the development of other lands. Within these islands, the newly-found north developed a new type of society; the division between capitalist and labourer assumed far greater importance, huge agglomerations of people were formed and social problems hitherto unknown obtruded themselves. In south-east England a similar development occurred as commerce, finance and the greatly increased government services transformed the metropolitan region. Thought, too, was everywhere affected. The industrial revolution both stimulated, and gave the material possibility for, the great advance of scientific knowledge. World-wide intercourse, ease of communication and the cheap production of books and newspapers led to widespread education and made possible popular appreciation of literature.

Such are a few characteristics of three stages selected in illustration of the development, and it may be noted that all the aspects of the life of man would be considered, not only political organizations and economic activities, but also social relationships and even intellectual and æsthetic advances. The evolution, however, has not been spasmodic, and the student of Historical Geography must trace the *continuous* development of the nation's environment.

This view of Historical Geography is by no means generally realized or accepted.* On the one hand, there are those who hold the limited view that it should deal only with military movements and territorial changes, a text to accompany the "Historical Atlas"; on the other, there are those who would make it a collection of historical incidents occurring in the region treated, a mass of facts recalling the farrago of information which used to be labelled Geography.

Consideration must also be given to the idea that Historical Geography should deal with those parts of man's history which affect the geography of to-day. Such matters, however, seem to the present writer to be part of Geography proper, for just as physiographic history should be included where it throws light upon the existing structure of the Earth's surface, so human history must be drawn upon to elucidate the social, economic and political conditions which form part of the complex with which the geographer has to deal.

To conclude, the writer suggests that students of Geography should limit themselves by the two principles enunciated above, while Historical Geography may be defined as the study of the evolution of man's environment, and of the interactions, at each stage of the evolution, between nature and man. Thus Historical Geography must base its inquiry upon the work of physical geographers on the one hand and upon the researches of historians upon the other; it should correlate their results and so justify its independent existence as a science.

J. F. UNSTEAD.

* But somewhat similar ideas have been discussed in conversations with Prof. Roxby and other geographers.

REVIEWS

EUROPE

Note on a Series of Early French Atlases, 1594–1637.— Sir H. George Fordham. Oxford University Press. 1921. Pp. 8. *Facsimile.*

THE paper is a short comment on the five, or rather six, atlases presented by the Author to the British Museum. The collection consists of two copies of the 'Théâtre Français' by Bouguereau (1594); two editions of the 'Théâtre Géographique du Royaume de France' by Jean Le Clerc and his widow (1621 and 1626); a copy of Melchior Tavernier's atlas with the same title (1637), and the fragments of a second copy with maps dating from 1627 to 1646. The addition of these atlases to our national collection gives to the British Museum the best and most complete collection of the early French atlases to be found anywhere. W. H. B.

Memoir on the Coalfields of Ireland.— Commission of Inquiry into the Resources and Industries of Ireland. Dublin: American Chambers, Lower O'Connell Street. 1921. Vol. 1, pp. 396 + xii.; vol. 2, Maps.

The origin of this work was an inquiry into the resources of Ireland undertaken by "Dail Eireann," which appointed a committee to investigate the power supplies of the country under the heads of coal, peat, water-power, and industrial alcohol. The committee in preparing the memoir on coal not only collected from published sources all available matter, but also visited the coalfields in order to investigate as far as possible the actual conditions of mining. The result is a valuable memoir which gives an exhaustive and apparently quite impartial account of the coal resources of Ireland, supplemented by a bibliography and a collection of large-scale coloured maps of all the coal-bearing areas. The known exposed coalfields of value are seven in number: Leinster, Slieve Ardagh, Munster, Connacht, Ballycastle, Coal-island, and Annaghone, with a total estimated content of 2,044,000,000 tons. Of this content 1,570,000,000 tons are in the Munster, and 299,000,000 in the Leinster coalfield. In both these and in the Slieve Ardagh coalfield, the coals are anthracitic. Bituminous coals occur in Connacht, Annaghone, and Coal-island. The Ballycastle coals are of Lower Carboniferous Age. Around and beneath Loch Neagh there seems to be an extensive concealed coalfield. Its extent is unknown, and the borings begun in 1918 were inconclusive, but the content is estimated at 50,000,000 tons per square mile. The compilers of this report also draw attention to the probability of a concealed coalfield beneath the basalts of the north-east. In 1919 the output of coal in Ireland was only 93,529 tons, of which 82,787 tons were available for distribution. Of this amount about 80 per cent came from the Castlecomer and Gracefield mines in the Leinster coalfield. Lack of railways, which hampered the development of these coals, has now been met, and an increased output may be expected, although it is significant that the output per man is only 130 tons at Castlecomer and 61 tons at Gracefield. The report contains full analyses of the various coals. The maps, produced in Dublin, are creditable examples of colour printing. R. N. R. B.

ASIA

Two Years in Kurdistan.— Captain W. R. Hay. London: Sidgwick & Jackson. 1921. Pp. 383. *Illustrations and Sketch-maps.* 21*s. net.*

But for the Great War, Kurdistan, the classical Corduene, would have remained outside the ken of the British public. The question of the control

of this remote province or of its abandonment has, however, been forced to the front by financial stringency in Great Britain, and we have to thank Captain Hay for giving first-hand information which may help us to form an opinion on this difficult question. His theme is the Arbil division which lies between Mosul and the Persian frontier, Arbil being the classical Arbela, which gave the name to the last great battle in which Alexander the Great finally overthrew the craven Darius and with him the Achæmenian dynasty. Incidentally it is interesting to note how little place-names in this country have changed during the last three thousand years or so, for Arbil was an Assyrian city sacred to Ishtar, and its name, meaning "Four Gods," has come down almost unchanged from the remote past.

The author points out that the country runs from south-east to north-west, shaped by the lie of the great ranges of Persia, with the Euphrates and the desert cliff marking the parallel boundary to the south-west. He makes the suggestion that the word Iraq, signifying "cliff," may have received its name from this natural formation. A reference to the older authorities shows that, in their opinion, the word is the Arabic form of Iran, but this seems to be somewhat far-fetched. Actually, only southern Mesopotannia was termed Iraq-i-Arabi, the northern section being called "Al-Jezirah," or "the island." It seems more likely that the word originally signified "country," and the fact that, in the twelfth century, Western Persia was called Iraq-i-Ajami, or "Barbarian Iraq," tends to strengthen this view and to discredit the other. In any case the desert cliff was far from Iraq.

A clear description of the country is given. It may be noted that the greater Zab—the local term for "river"—has more water in its channel than the Tigris at the point of junction. An important tributary is the Rawanduz, which rises on the Persian frontier at a point where the range dips to make an easy crossing into Persia, a fact of considerable strategical importance. This river pierces the heart of the mountains at Rawanduz through a magnificent gorge, which is well described and illustrated.

After dealing with the geography, the author portrays the Kurd, representing him as a solid, hard-working farmer who is advancing westwards at the expense of the lotus-eating Arab. He states that "the Kurd is a convinced aristocrat, whereas the Arab wavers between democracy and anarchy." Actually he only met an inferior class of Arab and makes this generalization, mainly from his own limited experience. One interesting point which he mentions is that no Kurd understands camels, and has to call in Arabs to tend them. The Christians are referred to but little, and it is explained how centuries of inferiority had cowed them, and that they suffered first in case of local troubles. In addition to Kurds, Arabs, and Christians, there is a string of towns—Arbil, Altun Keupri, Kirkuk, and others—running in a line from Mosul to Mandali, and dividing the Kurd division from the Arab, which are inhabited by a Turkish-speaking race, believed to be the descendants of the Seljuks, who occupied Iraq in the middle of the eleventh century of our era, and held it for some generations.

The position in Kurdistan was similar to that in Persia. The tribes were always ready to rob on the routes, the governors frequently maintained private bands of brigands, and it required a strong backing of troops and also a large expenditure of money to maintain even tolerable order among the tribesmen. Each Agha was intensely greedy for money, was ready to become an enemy if a decision were given against him, and was readily influenced by religious propaganda. The revenue would not pay the cost of an efficient government,

and outbreaks, accompanied by savage murders of British officers, would inevitably occur again and again.

The author gives a graphic account of the serious disturbances in 1920, which he was able to surmount in his own district, partly through his personal influence and partly through proximity to Mosul. His story indicates clearly how difficult the problem of Kurdistan is bound to be. He also shows us what zeal and courage were displayed by political officers under the inspiring leadership of Sir Arnold Wilson, a brilliant member of the Political Department of the Government of India, and he mentions the names of the gallant band who were murdered by the savage Kurds, whom they were trying to help.

From a perusal of this work, which can be strongly recommended, it is clear that Kurdistan cannot be held without mobile columns always ready to march out, large subsidies, and, above all, gallant young officers and non-commissioned officers ready to risk their lives at any time, of the type of the author of this book. P. M. SYKES.

The Rainbow Bridge.— **Reginald Farrer**, author of 'On the Eaves of the World.' London: Arnold. 1921. Pp. xii., 384. *Illustrations.* 25*s. net.*

Those who have enjoyed Mr. Reginald Farrer's earlier work 'On the Eaves of the World,' of which the present unhappily posthumous volume is practically a continuation, will open these pages with eager curiosity. An ardent, or rather an impassioned botanist, never so happy as when he had added a new species to our rock gardens, a close and keen observer of strange landscapes and peoples, Mr. Farrer was also the master of a vividly pictorial and intensely individual style, studied, yet natural to the man, that carries the readers, who are not put off by its elaboration and occasional affectations and humours, along with the author, compels them to share in his encounters and enthusiasms, and almost makes them feel as if they were of the party. We find ourselves wandering in spirit over the bleak, bare, rolling foothills and rugged mountains, ranging from 8000 to 14,000 feet, which constitute the Tibetan frontier of Kansu, the extreme north-western province of China proper, colloquing with Buddhist abbots and Chinese mandarins and making friends with matriarchal farmers. The narrative takes its start from Lanchow, the capital of the province, where the author and his companion Mr. Purdom (whose recent death in China we have to record with great regret) spent the winter of 1914–15, a typical Chinese city with high walls and tiled temples and a Viceroy whose genial habits were concealed under an austere demeanour. The following summer was spent in investigating the flora of the uplifted land that stretches out towards the remote waters of the Koko-nor. The loftier ranges fail to soar into conspicuous peaks like the Alps or Himalaya, and they carry no perpetual snow or glaciers. The summer landscape depends for its charm on the purity of the atmosphere and the local colouring, and above all on the wealth of the flowers that make every cup in the hills an alpine garden. Mr. Farrer was not one of the collectors who care only for a rarity they can give a name to. If he is proud of his own primula and gentian, he breaks into eloquence that appeals even to the profane over the varied profusion of the mountain lawns. And on occasion he is apt to warn the general reader to skip the botany and go on to the human adventure, which is never far to seek.

We can turn from the scented flower fields to the descriptions of the great monastic establishments, some almost towns like Tien Tang, inhabited by throngs of dignitaries, and of "gleeful little mobs of monklets, acolytes, novices, and students"; others like Chebson, "huge and serene, with here and there big

churches and full in the middle the main church of all, a splendid great block of soft crimson, roofed most gorgeously in gold with golden dragons spouting off the rain-water, and golden stags and wheels and pillarboxes adorning its parapets"; or enjoy the company of "magnificent strapping Mongols with peaked caps of fur and scarlet and scarlet robes, and great square reliquaries of silver flashing on their breasts."

The concluding chapters tell the story of the travellers' return journey by cart and litter across the whole breadth of China, until a stream was reached which bore them down through the gorges of the Yangtze Kiang to Ichang and the outer world.

To readers by whom a talent for bringing home to us strange places and races is reckoned for a merit Mr. Farrer's volumes will be a valued possession. Yet it cannot be denied, we fear, that in some respects they fall notably short of the standard of the serious geographer. He carried no survey instruments, he took no precise altitudes, he contributed on the whole little to cartography. He spelt Chinese local names after a system of his own; he often amused himself by converting them into their English equivalents. When, as on the loftier ranges, the summits were anonymous, he gave them fancy Greek names, such as Keraunos, Axeinos, Thanatos. But the traveller who vexes the souls of editors and mapmakers is apt to win the ears of posterity, and despite these superficial vagaries we prophesy for Mr. Farrer's books a secure place in the literature of travel.

The map that accompanies his last volume is deplorably inadequate. That published with Mr. Teichman's "Routes in Kansu" (*Geog. Journal*, vol. 48) does not seem to have been made use of. The lack is rendered more annoying by the abundance in the text of topographic detail which it is impossible to follow without help. There are some fair illustrations, but we could have done with a few coloured reproductions of the author's charming drawings of his beloved flowers.

D. W. F.

AFRICA

The Tanganyika Territory (formerly German East Africa); Characteristics and Potentialities.— F. S. Joelson. London: T. Fisher Unwin. 1920. Pp. 256. *Sketch-map and Illustrations.* 21*s. net.*

The weakest point in this pleasant book is its title. The reader will find plenty of interesting subjects discussed in its pages, but on the potentialities of the country the author is practically silent, while he deals with the characteristics of only a small fraction of the 384,000 square miles which it covers. The opening chapters, in which the town of Dar es Salaam and part of the Central Railway are described, are vivid and true to life, but a little clogged by verbal embroidery, and in saying that the German programme of railway construction was mainly based on strategic considerations, Mr. Joelson is hardly correct. The construction of the Central line was, as a matter of fact, part of a well-thought-out scheme for linking the three great lakes, Victoria Nyanza, Tanganyika, and Nyasa, with German ports, and thereby capturing the greater part of the trade of Central Africa. Leaving the railway, we are given a picture of the Rufiji river in its changing moods which shows a genuine gift for descriptive writing and contains some passages of real beauty and convincing truth. From this the author turns to what is obviously his favourite subject, and losing his tendency to ornateness, sketches with skill and sympathy the types of native with whom he came in contact. His comments on their methods of thought and development are shrewdly analytical. A chapter on missionaries

is written with scrupulous fairness, and the criticisms of their methods, though rather unfavourable, are usually constructive, while great stress is laid on the fact, too often forgotten by theorists at home, that the inculcation of a habit of work is an essential preliminary to sound development.

Many reports, official and otherwise, have familiarized us with the horrors of German colonial maladministration; but the stories told by Mr. Joelson of the brutal and often fantastic cruelty with which the most trivial offences were punished by the late rulers of the colony cannot fail to re-awaken our horrified wonder at the type of man sent out to Africa by what we used to look on as a cultured Christian State. From this record of administrative insanity one turns with relief to that of the East African Intelligence Service and of our great opponent, Von Lettow Vorbeck, whose gallant fight against odds compels the admiration of his enemies. Finally, a faithful portrait entitled "The Old African" will appeal less to stay-at-home readers than to those who know the type, and possibly some of the latter will feel, with the reviewer, that they have met at least one of the models from whom it is drawn. L. F. I. A.

AMERICA

The Fur Trade of America.— **Agnes Laut.** New York: The Macmillan Company. 1921. Pp. xv. and 341. *Sketch-map and Illustrations.* $6.00.

The main theme of this book is the transference of fur from the back of the animal to the back of the human being, together with all the adventure of the trapper and the artifice of the manufacturer to make the best of the raw material.

In Part II. the author reveals her wide knowledge of the wild illimitable regions of the fur-bearing animals, and describes in the spirit of the north land the habits of the fur-bearers and the season and manner of trapping, spiced with stories of adventure on the part of those who seek the peltries.

Part I. carries the story of the furs from Barren Lands and reedy swamps to the factory, the warehouse, and the home, though even in the more technical treatment there is preserved the racy narrative and personal touch which reveal the passionate lover of the wild. The ordinary reader, and especially one who has a predilection for furs, will find a great deal of useful information on the preparation and preservation, the dyeing and faking of furs. Throughout Part I., running as it were as a commentary on the fur trade, are ideas and suggestions which might provide matter for much discussion. Have the Arctic cold and immature drainage of the north and east set limits to the settlement of man and given to the fur-bearers lands of which they hold a lease in perpetuity? How far will fur-farming develop, and what will be its effect on the trade and on the trapper? Has the Great War so dislocated the fur fairs and markets that henceforth the three towns of Nijni Novgorod, Leipzig, and London with their commercial connections must look upon the three towns of Montreal, St. Louis, and New York as their successful rivals without the possibility of a recovery of their former position?

While not claiming to be highly technical, the book gives much more than a popular account of furs, fur-trapping, and fur-trading. Statistics are given generally for 1920, showing the present position of the trade, the trend of the markets, and the change of fashion. An appendix gives in summary form the laws relating to trapping in the States and Provinces of North America.

The book contains numerous illustrations, though photographs of stuffed animals seem out of keeping with the live character of the narrative. A

sketch-map of North America distributes the chief fur animals into eleven territorial divisions with their markets, though the basis of this division is not indicated. W. H. B.

The Norse Discoveries of America: the Wineland Sagas translated and discussed.— G. M. Gathorne-Hardy. Oxford: Clarendon Press. 1921. *Maps.* 14*s. net.*

The Norse movement to the American continent has of recent years been the subject of renewed investigation and controversy. The Wineland Sagas still remain the only source of information, so that each new contribution represents but conjecture on the historical accuracy of the narratives and the routes and landfalls of the voyagers. The present work was written before the war, but was cast in its final form after the author had considered the recent investigations of Babcock, Hovgaard, Steensby, and others.

The problem has been approached mainly through a study of the Sagas as literature. Part I. is a translation of the Wineland Sagas—the Eric Saga, Hauk's Book, and the Flatey Book—and the aim has been to offer a continuous narrative drawn from all three sources indifferently. The author thus obtains a fuller account of the Wineland voyages than is comprised in any one version. Such a method is open to criticism, partly because the narrative so derived exceeds the warrant of any one saga, and partly because it gives a false impression of accuracy by retaining certain parts of each saga and relegating the conflicting portion to an appendix.

In Part II. the author justifies this action on two grounds: first, the essential historical accuracy of all the sagas (p. 195), and secondly, the special importance of the Flatey Book. Contrary to the generally accepted view, he follows Dr. Fossum ('The Norse Discovery of America') in his preference for the Flatey Book version where it differs from the other two, and in making the Flatey Book a Greenland saga specially describing the deeds of Eric the Red and his family. Both Dr. Fossum and Mr. Gathorne-Hardy therefore contend that the two versions—the Icelandic saga contained in the Hauk Book and the Greenland saga of the Flatey Book—amplify each other and make possible a full story by the amalgamation of the two.

But, as Vignaud wrote in 1910 ('Les Expéditions des Scandinaves en Amérique,' p. 7), "Ces traditions n'ont, certes, pas la valeur de témoignages contemporains," and it does not seem justifiable to take any or all of the incidents and combine them into a new story as though they carried the stamp of authentic history.

The author discusses his case ably and in scholarly manner, and may carry the less critical and less sceptical with him. He then proceeds to investigate the probable routes and landfalls. How impossible it is to fix these is realized when one remembers that Dr. Fossum locates Vinland up the St. Lawrence, Babcock argues the case for Passamaquoddy Bay at the mouth of the Bay of Fundy, and others place it in the region of Cape Cod. Mr. Gathorne-Hardy urges an entirely new region as the farthest south of the Karlsefni expedition. From the neighbourhood of Godthaab in Greenland it first touched land probably in Labador, possibly in Newfoundland. Thence it may have reached Cape Cod (*Markland*), and sailed along *Furdustrandir*, the long sandy beach southwards from Cape Cod, round the Barnstable peninsula to Long Island Sound. This, the author contends, is *Straumfjord* leading to *Hóp*, the bay of Hudson river. Wineland the Good, the land of plenty and mild winters, is placed along the southern seaboard of New England to the site of modern New York.

The case for the sagas and for the voyages (illustrated by maps) is well put and ably discussed. The author has undoubtedly fulfilled his aim in presenting the story in a captivating way and in a manner that will compel the student to turn over again the scanty material we have of this remarkable venture. A chronological summary of the events and a genealogical table of persons connected with the sagas are given, and these with the bibliography complete a volume which constitutes a valuable addition to the literature on this subject.

W. H. B.

AUSTRALIA AND PACIFIC ISLANDS

Fiji: its Problems and Resources.— Major W. A. Chapple, M.D., Ch.B., M.R.C.S., D.P.H., R.A.M.C. (retd.). London and New Zealand: Whitcombe & Tombs. 1921. Cr. 8vo. Pp. 188. *Sketch-map and Illustrations.* *7s. 6d.*

This is a handy little volume for the capitalist or intending colonist to study, but not to pin his faith upon. It affords a concise and apparently unbiassed conspectus of the commercial openings that Fiji presents, or ought to present, and it comes before the public at an opportune time. The author divides his thirty-three chapters into a consideration of this group of very diverse islands as a single entity, the three main constituents of the population (Fijians, Whites, and East Indians), their interdependence and their several interests, habits, and abilities, the land in reference to its aboriginal owners and the Government's system of leasing, the productivity of the soil, its capabilities for stock breeding, the principal planting industries established or worthy of trial; and he treats of Fiji as a field for investment of capital. The labour shortage, which in Fiji as elsewhere is the burning question of to-day, comes in of course for a full share of discussion; but its present unsettled state makes this subject very difficult of review, and still more profitless to forecast perhaps at the present moment. Two short chapters are devoted to "The Pacific of the Twentieth Century" and the part Fiji may be destined to play in "the Naval Defence of the Pacific."

In spite of the merits of the book many of the author's statements and opinions will betray to the experienced settler in Fiji a hurried and superficial study of the subjects he treats, and will appeal to the old resident in the islands as the views of an optimist whose glance at the colony has been through rose glasses. The book contains several exaggerations, some repetitions, and some self-contradictions, which point to lack of care or excess of hurry in editing. Should a second edition be called for the chapter on rubber might be re-written with advantage, to bring it up to date. The statement on page 95 that "nearly all the whites drink" is a mere untruth; it suggests that the author is a too enthusiastic advocate of teetotalism, or that he mixed while in the colony with the wrong social set. The entire elimination of the word "black" in relation to coloured races in India and Fiji would be a graceful improvement and a tribute to anthropological fact. A curious slip on page 82 is the word "shagreen" for "chagrin"; and on page 98 why does a medical man write "concoction" for what is a simple cold aqueous infusion? The illustrations are good, but no acknowledgment is paid to Mr. Waters, from whose original negatives or prints many of them are reproduced. The small map of ocean steam communications might have been omitted, or else made vastly better.

B. G. C.

GENERAL

Maps: Their History, Characteristics, and Uses.— Sir Herbert George Fordham. Cambridge University Press. 1921. 8vo. Pp. xii. + 83. *7s. 6d. net.*

This handbook is based on five lectures given to teachers with the object of presenting such an insight into the history of the modern map that it should be regarded not merely as a mechanically produced drawing, but as a document whose notation and form are the results of long experience and necessity. The book sketches the history of map production from earliest times, tracing the outlines of historical sequence and development as applied to maps.

The material has been so well selected and handled, however, that the reader is made to feel that in studying the evolution of maps in general he is at the same time being supplied with data which enable him to appreciate the full significance of, say, the International (1/1,000,000) Map now in progress. A map of this character involves two sets of activities: one exploration, gathering knowledge of the region afterward mapped; the other the invention of a notation by which natural features and artificial works may be depicted. The author has limited himself almost entirely to the latter considerations, and these only in so far as they were developed in the lands of the Mediterranean and the north-west of Europe.

The title suggests a much wider treatment than is actually presented. No reference is made to the remarkable development of surveying and cartography in China culminating in the incised stone maps of the eleventh and twelfth centuries found at Singan-fu. These maps of China compare in accuracy with the later portolani of the Mediterranean. Where, however, the land maps found their limits in the extent to which military conquests were carried, and declined with the decline of military authority, the sea charts found no such limitations.

In course of time the "wet-ways" of the Mediterranean led out to the open ocean and beyond, and the portolani extended their coastlines, supplying frameworks which later surveyors filled in with roads and other details. It is therefore to be regretted that the limits of space did not permit greater attention to the globes and charts that appeared during the closing years of the fifteenth century and the first half of the sixteenth. The globe of Martin Behaim (1492) marks the close of the period when the western European looked to the rich East only across the intervening land of the Old World. With the portolan or chart of Juan de la Cosa, a new age of maps begins, stretching beyond the possibilities of the portolani of Italian and Catalan sailors, and developing within half a century into the world-maps of the Dieppe School, and giving by the close of the century the remarkable maps of Wright and Hondius.

When we come, however, to the survey maps of individual countries, and especially of Britain and France, we find an ampler treatment which gives a new meaning to modern ordnance maps. It is here that the book is particularly valuable, leading one by devious road-maps, with their struggles for suitable topographical notation, to the ordnance survey maps of to-day with their wealth of detail and high technique.

The book, with the syllabus of the original lectures given as an appendix, is to be welcomed not only as a guide for the study of maps in schools, but as the first of what, one may hope, will be a series of books on the evolution of the map and its relation to geographical discovery.

W. H. B.

The Geology of the British Empire.— F. R. C. Reed. London: Edward Arnold. 1921. Pp. 480. *Maps and Sections. Price* 40*s. net.*

Mr. Cooper Reed essayed a formidable task when he undertook to prepare a treatise on the geology of the British Empire. It is practically impossible in the limited space available to deal even-handed justice to all its scattered territories, even when the British Isles are omitted from the purview of the work. Inevitably undue attention is given to the smaller isolated dependencies: each of the great Dominions and India needs a substantial volume for itself. These brief descriptions of the geology of great continental areas cannot be regarded as having much genuine educational value. There is no space for such a development of the subject as would enable the student to realize the characters of the rocks and their relations. In conjunction, however, with the lists of the literature of the different areas the book constitutes an invaluable work of reference which should find a place in every college library and that of every institution which is concerned with the development and prosperity of the Empire.

Perhaps the most satisfactory portion of the book is that dealing with the Dominion of South Africa and the tropical African protectorates, which occupies 128 pages of text out of a total of 461. The main structural features are clearly indicated, as well as the general nature of the formations.

The Dominions of Canada and Newfoundland have, on the other hand, only 62 pages devoted to them, though their extent and wealth and the great variety of the geological features would seem to demand much fuller treatment. The same considerations apply in the case of India (including Burma), which is allotted 59 pages. In such a condensed abstract by an author who has no personal acquaintance with the area, some inaccuracies of statement could hardly be avoided. On p. 271, "northward into Tenassarim" should have been "southward." It is no longer true, as stated on p. 303, that the Digboi oilfield is the most important commercially in the Assam and eastern Bengal area. The Badar Field (which is not mentioned) has now a greater output. Again, the ironstone shales of the Damuda Series, referred to on p. 309 as extensively worked, have not been used for years. Australia is disposed of in only 47 pages, but the best use is made of this limited allowance to the Island Continent.

Map Projections.— Arthur R. Hinks, C.B.E., M.A., F.R.S. Second edition, revised and enlarged. Cambridge University Press. 1921. *Diagrams.* 12*s.* 6*d. net.*

It is pleasant to note that there has been a demand for a fresh edition of Mr. Hinks's book on map projections, which serves as an admirable introduction to a technical subject of every-day importance to geographers. The new edition is a reprint of the old, with three additional chapters and some small corrections to the former text. It is not so very long ago that the whole subject was much neglected in this country, and it is due to Mr. Hinks, Mr. A. E. Young, Mr. J. I. Craig, and a few others, that it is now receiving the attention that it deserves. For it is, in spite of the difficulties of its mathematical treatment, a subject which no practical mapmaker can afford to neglect, for its proper understanding does much affect the value of the maps that he produces.

Thus, had our predecessors, a hundred years ago, made use of Mr. Young's modification of Cassini's Projection, it would have been possible to have plotted a larger number of counties of the British large-scale maps on one

meridian, and thereby to have saved inconvenience and expense. Again, the war brought out the necessity for a complete understanding, on the part of military geographers, of the mathematical qualities of the maps of France and Belgium, and of possible better systems. This was a matter, not of merely scientific interest, but of genuine practical importance, in the use by the artillery of the data furnished by the surveyors. Mr. Hinks gives an interesting sketch of the steps by which it became known that the French were actually using, for their new projection for the Western Front, Tissot's projection of minimum deformation, and not, as had been supposed, Lambert's conical orthomorphic projection. It may be said, in parenthesis, that both the French and British geographical services in the field were informed that the projection was Lambert's. The difference, however, is slight.

Mr. Hinks rightly gives the impression that the subject is by no means exhausted. It is, indeed, very much alive, and the new edition of his book will, it may be hoped, stimulate many to dive into the fascinating problems that it presents, problems which are no less interesting to the theoretical student than they are valuable to the actual maker of maps. Although the book under review is primarily intended for the practical man, it may be confidently recommended to all interested in the subject, whether from the point of view of the actual constructor of maps or from that of the student of theory. Both will find much to interest them, and not a little that cannot conveniently be found elsewhere. C. F. C.

THE MONTHLY RECORD

EUROPE

The Rainfall of France.

A DETAILED discussion of the rainfall conditions of the various regions of France has appeared at rather long intervals during the last few years in the *Annales de Géographie*, and in the issue of that journal for March 1921 the author, the well-known French meteorologist M. A. Angot, presents an interesting summary for the country as a whole. In the mountainous departments of Hautes-Pyrénées, Haute Savoie, Doubs, Jura, and Basses-Pyrénées the mean annual values exceed 1000 mm. (40 inches), whilst in the low-lying departments of Seine, Seine-et-Oise, and Eure-et-Loire, as well as in Bouches-du-Rhône in the far south, they fall below 600 mm. (24 inches). The mean annual fall for the whole of continental France is given as 831 mm. (33 inches), which is but slightly below that for England and Wales (35 inches). The sensible equality in the rainfall of England and France is interesting, suggesting that the generally higher temperature of France, which is a factor favourable to a heavier rainfall, is more than set off in England by the greater persistence and strength of the humid Atlantic winds in relation to the configuration of the land. If we consider the greater size and complexity of France, the seasonal variation of the mean rainfall appears to be rather simpler than in England. France is typical of the west-central European region of wet autumns, the month of October showing at most stations either the principal or a decided secondary maximum. The driest month is February, except in the Mediterranean region of dry summers, where it is July. It is noteworthy that whereas certain parts of the centre and south-west of France show the chief maximum in May or June, pointing to a predominance of early summer thunderstorms, the month of July is, for a summer month, dry nearly

everywhere. It would appear that the Mediterranean *regimen* of summer drought, which affects southern France, influences the whole of the country to the extent of checking somewhat the frequency of those heavy local thunderstorms, or heavy general rains, which characterize July in most countries. Taking the country as a whole, July is the third driest month, being surpassed only by February and March. The number of rainy days exceeds 180 in Normandy and Brittany, but is much less in the interior, and falls to the neighbourhood of 80 along the Mediterranean coast. On the Puy-de-Dôme the number is as high as 248, but on the much higher Pic-du-Midi, which is often above the cloud-level, it is no higher than along the north coast. On the other hand, heavy falls of rain, exceeding 4 inches in twenty-four hours, have occurred nine times in thirty years on the Pic-du-Midi, and only three times on the Puy-de-Dôme. The frequency of heavy falls of rain is greatest in the Mediterranean region, and least in the north and west of France; but whereas in most parts they characterize the hot season, in the peculiar Mediterranean region of dry summers the minimum frequency is in July and August, and the maximum in October and November.

Forms of Settlement in Belgium.

A first attempt at a map of Belgium showing the distribution of the various forms of human settlement has been made by Marguérite Lefèvre in *La Géographie* for June 1921, with accompanying letterpress. Few attempts of the kind have yet been made in any detail, though the subject has been approached from a more general point of view by Meitzen in Germany, and in regard to special countries and districts by a limited number of students both in Germany and elsewhere—Schlüter, Blanchard, Krebs, and others. As the present author allows, the mapping, and especially the explanation of the distribution of forms of settlement, is still in a tentative stage, but general principles may in time be established if the facts for various countries are carefully collected. The first part of her study is devoted to a setting forth of the facts for Belgium, illustrated not only by a general map but by sample maps illustrating the several types, taken from the 1/100,000 map of Belgium. In the first place, a broad distinction is drawn (as by Meitzen) between the north and the south, though the writer draws the line of partition somewhat differently from the German author. In the north the general tendency is for habitations to be widely scattered; in the south to be more or less concentrated. In each area minor subdivisions can be defined. Thus even in the north the dispersion may be into large isolated farmsteads, as in the rich polder lands; or in long narrow bands, following the dykes or main roads; or into small hamlets, as in the infertile Campine plain; or, again, the houses may be as it were "powdered" over the surface. In the south the concentration may be in various forms, which the author describes as "nebular" (taking an exaggerated form in the more strongly industrialized parts), "nuclear," and that of "crossway" villages, spreading in star-form along several roads which meet in a point. The causes which have brought about this state of things may be either ethnographical, environmental, or economic. Meitzen found an ethnological reason for the broad distinction between the north and south, the north having been overrun by German tribes still in a nomadic state, who took over the pre-existing Celtic form of settlement, while the south was invaded later, when the Germans had developed a more advanced village life. The writer does not accept this view, holding that the contrast would be rather between the Celtic farm-steading of the north and the

Roman "villa" in the south, Germanic influence being relatively unimportant; and that after all the difference would not amount to more than a *tendency* to dispersion in the north and to closer building in the south. Coming to the influence of environment, she finds this of much greater importance, the operation of the forest, occurring chiefly in the south, being particularly effective. The absence of this in the north, coupled with the more fertile soil and the presence of water at a slight depth, favoured dispersal, while concentration was induced in the south by the presence of the forest, the different mode of farming, and the depth of the water-supply. Modern industrial development has introduced entirely new types of peopling.

AFRICA

The Tanganyika Territory.

The report on this territory presented to Parliament in July last is a document of great interest as the first attempt to discuss the manifold problems, administrative and other, arising out of its transfer to its new rulers. It opens with general information on the territory which it is useful to have in concise form, but which is for the most part already well known to those acquainted with the considerable German literature thereon. An exception is the section, extracted from a report by the Game Warden, Mr. G. F. M. Swynnerton, on the fauna of the territory in relation with the vegetational features, which contains original observations of much interest. The territory, it is pointed out, is the meeting-place of African distributional areas, and it offers every main type of condition, vertical or horizontal, to be found in tropical or Eastern Africa. While the faunal groups of Somaliland and Mozambique are the most conspicuous, elements of the West African Forest region, of the East Sudan and Upper Nile area, and of the Zambezi–Angola area also enter. The ecological divisions and subdivisions are described under the main heads of (1) animals associated with water, (2) those associated with the primary forest, (3) those of the annually burned plant-formations, the relations of the animals to their environment in each being carefully brought out. A word of praise is given to the policy of the Germans in the matter of game reserves, which seems to have been founded on sound principles. The main problems connected with the fauna are tsetse-control and control of vermin, both of which are being taken in hand, but we are not told whether conclusions have been arrived at on the vexed question of the relation of the tsetse to wild game. In connection with the administrative problems the German system and its abuses are dispassionately discussed, and some thoughtful observations are quoted from a report by Captain Orde-Browne, O.B.E. One of the evils of the old *régime* recognized even by the German authorities arose from the wholly inadequate European staff maintained (seventy-nine only in 1914). The control of the natives was delegated to a few powerful *Akidas*, assisted by numerous *Jumbes*, the former being usually quite oblivious of native ideas and customs. It is desirable to eliminate the *Akidas* so soon as may be possible, for if efficient (as they appear often to be) they are dangerous. Yet it seems unwise to break with such remnants of system as are left, and it may be best to go to work gradually, replacing the *Akidas* in course of time by men more in touch with the people. The attitude of the natives to the British is curious. They no doubt consider us a great improvement on the German, but they seem to look upon us as easy-going people with whom liberties may be taken, so that a firm hand is needed. The ex-German Askaris—some six thousand—have been a source of anxiety, but

they appear to have returned contentedly to the conditions of normal life. Slavery is a matter that has to be dealt with. The conditions of domestic slavery under the Germans were not irksome, and the slave enjoyed safeguards, but the mandate requires the eventual emancipation of all slaves. The German system of education resulted in producing a large number of natives able to read and write, and better able to be of use to the Administration than most of the natives in British African protectorates. It will take some time, however, for the schools to recover the ground lost during the war. The report also gives useful information on means of communication, agricultural and mineral production, forestry, etc., etc., as well as on the present financial position of the territory.

The Darfur-Wadai Boundary.

The joint commission for the delimitation of this boundary left for its scene of action during the autumn, and we may hope that one of the last unsettled boundary questions in the African interior may now soon reach a permanent solution. The boundary was roughly defined by the Anglo-French Agreement of 1899 (*Journal*, May 1899, pp. 524–528, with sketch-map), the guiding principle being that the line should leave the kingdom of Wadai to France, while the British sphere should include what constituted in 1882 the province of Darfur. Between 11° and 15° N., it was to run in any case somewhere between the meridians of 21° and 23° east of Greenwich. South of 11° it was to follow "the water-parting," though strangely enough the only water-parting previously mentioned in the defining paragraph had been that between the Nile and Congo, while here of course it is the Nile–Shari water-parting that is in question. The delimitation will no doubt meet with some difficulties, since in the unsettled state of native politics in this region it is not easy to decide what have in the past been the limits of influence of Darfur and Wadai, and some amount of compromise seems almost inevitable.

Motor Expedition across the Sahara.

It is announced in *La Géographie* for November 1921 that an attempt to cross the Sahara with twelve motor vehicles will shortly be made. The starting-point will be Tuggurt, the terminus of the Algerian railway, and the proposed route leads by Insalah, the Hoggar region, and Adrar of the Iforas, to Bureni on the Niger 200 kilometres east of Timbuktu. The leader of the expedition will be Commandant Lafargue, and it will include a dozen members representing various government departments and other interests, among them being a cinema operator. It is hoped that the difficulty caused by the evaporation of the motor spirit in so torrid a climate has been overcome, but it is pointed out that there is a vast difference between the exceptional use of motor traction in this region for a special purpose, which may be feasible, and its regular commercial use.

POLAR REGIONS

Danish Expeditions in Arctic North America.

The well-known explorer Knud Rasmussen has now inaugurated his proposed expedition to the North American Arctic Archipelago which it had for many years been his ambition to undertake, principally with a view to ethnological research among the Central Eskimo. The scheme was originally put forward some twelve years ago, when he outlined his plans in the *Journal* for March 1910 (p. 295), but the means were not at once forthcoming, and his attention has been given during the interval to his important explorations in

Northern Greenland, made from his permanent station of Thule. The present expedition counts as the fifth organized from that base. Some account of his programme was given in Part II. of the *Geografisk Tidskrift* (R. Danish Geogr. Society) for 1921, with a sketch-map of the proposed routes. The programme is most comprehensive, embracing work in the fields of cartography, geology, biology, as well as the primary objects of ethnological and archæological research, which include the taking of living pictures. The personnel of the party includes, besides the leader and his old companion Peter Freuchen, Messrs. T. Mathiassen and Birket Smith, four Polar Eskimo hunters, and one Greenlander as interpreter and secretary. Last year was taken up with the collection of the party, dogs, and impedimenta, an epidemic of pneumonia among the Eskimo causing some difficulties. On September 7, however, Rasmussen was able to leave Godthaab in the *Sea King* bound for his first winter quarters in Lyon Inlet at the southern end of the Melville peninsula, whence he hopes to undertake a winter sledge-expedition to the Igdlulik tribes dwelling about Fury and Hecla Strait, and to explore the west coast of Baffin Land. During the present year he will proceed to Chesterfield inlet, where the collections will be left in a temporary depôt, and in the autumn will strike overland through the Barren Grounds to the next winter quarters at the mouth of the Coppermine. In 1923 he hopes to return east to Melville peninsula by the channels south of Victoria and King William lands, and a route across the Boothia peninsula, completing his work in 1924 by striking north by the western end of Baffin Land, across North Devon island and Ellesmere island to Etah on Smith Sound, whence he will regain his station at Thule. Regarding the fortunes during 1921 of the other important Danish expedition in this part of the world, that of Lauge Koch to the extreme north of Greenland (see *Journal*, vol. **56**, p. 323; **57**, p. 66), we are still without news. From a letter written by him in January 1921 we learn that in the previous October and November he had made a sledge journey over the inland ice to 80° N. in Washington land, afterwards traversing Melville bay to Upernivik. The object was in part the laying of depôts, in part reconnaissance and scientific observations. He had made trials of his motor-tractor with good results, and considers that such vehicles will prove of great use for polar work. In March 1921 he was to start north for Peary Land from his quarters on Inglefield Gulf, returning over the inland ice after carrying out geological and cartographic work during the summer.

MATHEMATICAL AND PHYSICAL GEOGRAPHY

The 1/M Map of the World.

The publication, by the Central Bureau of the International 1/M map at Southampton, of a first annual report giving full information as to the state of the undertaking down to April 1921 is to be heartily welcomed. Although it runs to only 41 pp. apart from index maps and other graphic information, its preparation has evidently involved much labour. The introduction gives a concise *résumé* of the history of the map, from the first mooting of the project by Prof. Penck in 1891 to the early part of last year, when the work, which had been more or less in abeyance during the war, had been once more taken seriously in hand. Reference is made also to the influence of the 1/M map on mapping in general, as shown by the adoption of the projection and sheet lines for maps not falling strictly within the international rules. Such is the provisional issue of a large number of sheets under the direction of the British General Staff during the war. It is pointed out that "so closely does the large and valuable

block of mapping conform to international ruling that it is a doubtful point whether some at least of the sheets composing it ought not to have been considered as in accordance with the international convention." That it has not been so considered is due to No. 14 of the resolutions of the Paris Conference of 1913, that "supplementary . . . editions not practically conforming to the decisions of the Conference shall not be regarded as forming part of the international map of the world." The value of this work is, however, recognized by the devotion to it of a special appendix and index-map. The most welcome part of the present report is the tabulated statement of the sheets either published or in preparation by the various countries throughout the world, with the address of the responsible official in each. The data have been obtained in reply to a circular letter sent in December 1919 to those concerned and repeated in October 1920. The facts are also shown graphically in index sheets of the world as a whole and of several continents.* The sheets actually issued do not yet make any great show, the only areas yet mapped by more than two contiguous sheets being in India (eight sheets) and the Argentine (three sheets), and of these it is only the Indian sheets which conform to the decisions of the conference of 1913, which owing to the war did not reach the Argentine until too late to be utilized for the first issue. One of the sheets issued is that covering Siam, which has shown a praiseworthy enterprise in taking up the work. Large areas are covered by sheets in preparation, especially in Europe, the United States, and South America, but the precise meaning of this must probably vary a good deal. One of the most interesting details of the report is the sheet illustrating the construction of the scale of colours by suitable combinations, whereby thirteen gradations are obtained for the land by the use of six plates only, each of which (except the green, for land below 200 metres above sea-level) gives three different tints by the use of rulings and the solid colour. The result attained is eminently satisfactory. The decisions of the Paris Conference of 1913, and the scheme of conventional signs adopted, are also reproduced,† and a concise and well-selected bibliography is supplied.

The Chemistry of the Earth's Crust.

This is discussed at some length by H. S. Washington in the *Journal of the Franklin Institute* for December 1920, on the basis of a large series of analyses of rocks found in different parts of the world. His conclusions, though tentative and very cautiously expressed, are of far-reaching importance. Only the igneous rocks are included, but these constitute 95 per cent. of the crust, and the sedimentary rocks which are neglected are ultimately traceable to pre-existing rocks of igneous origin. The igneous rocks are predominantly composed of silicates, with an excess of silica in the form of quartz. The "average rock"

* The indication of the sheets in preparation by a narrow red line round the margin is not so distinct as could be wished in the case (which occurs in the U.S.) where sheets not yet in preparation are entirely surrounded by others which are, the red borders of which might at first sight be taken as applying to the included sheet also.

† The text of the resolutions is printed in French and English, and both these languages are considered as equally "official." But it is important to remember that only in the language of the country in which was held the conference by which the decisions were formulated, is it regarded as "authoritative." The need for such a proviso is apparent in the present case, where the English translation is not always satisfactory. Thus whereas the French rule 10 h., for the method of showing lakes of fluctuating level, is sufficiently precise, the English translation is loose and unmeaning.

may be described as a granodiorite in which quartz and the felspars of lime, potash, and soda would be the most abundant minerals.

Out of 44 chemical elements which have been detected in rocks the 10 most abundant are: oxygen, 46·4 per cent.; silicon, 27·8; aluminium, 8·1; iron, 5·1; calcium, 3·6; sodium, 2·85; potassium, 2·6; magnesium, 2·1; titanium, 0·63; and phosphorus, 0·13. It is found that the igneous rocks are by no means uniformly distributed, but exhibit well-marked regional peculiarities of composition, so that it is possible to define a number of "co-magmatic" regions, within each of which the igneous rocks appear to have been derived from a common magma. Interesting suggestions are made concerning the vertical distribution of elements in the Earth. The elements of low atomic weight, occurring normally as oxides, silicates, chlorides, and fluorides, which make up the bulk of the crust, are designated as "petrogenic," that is "rock elements," whilst the scarcer elements of high atomic weight occurring as "native" metals, sulphides, etc., are called "metallogenic" or "ore elements." Reasons are given for the suggestion that while there is an outer silicate crust consisting of the lighter petrogenic elements, there is a central core composed of heavier metallogenic elements, with an intermediate zone constituted essentially of nickel and iron. It is claimed, further, that such a vertical arrangement is in harmony with Abbot's views concerning the distribution of the elements in the sun. Finally, Washington shows the bearing of the local variations of the chemical composition of the crust upon the question of isostasy. He shows that as a rule the specific volumes or reciprocals of the densities, as calculated from the chemical composition of the rocks, are found to vary directly as the elevation of the continents and ocean floors. The densities of the rocks, in other words, stand in inverse relationship with the heights of the surface, so that a higher column with less density in one locality is balanced by a shorter column with greater density in another.

GENERAL

A proposed Italian General Atlas.

Although the very name "Atlas" as applied to a collection of maps had its first origin in Italy—in the title-page of Lafreri's great collection in the sixteenth century—that country has produced nothing in modern times which could in any way vie with the best Atlases of Germany, France, and Great Britain. It is therefore not surprising that a movement should have lately been set on foot to remove the reproach, through the proposed publication, by the Touring Club Italiano, of an Italian general Atlas of the highest class. An account of the progress so far made with the scheme was submitted last year to the eighth Italian Geographical Congress by Commander L. V. Bertarelli, Director of the Touring Club and also of the organization for the preparation of the Atlas. In November 1917 the council of the T.C.I. decided to undertake publication, and, backed by the resources of the club, the undertaking has been placed on such a footing as to give good hopes of success. The scientific direction has been placed in the hands of Prof. O. Marinelli, the technical in those of Signor P. Corbellini. A school of cartography has been formed for the training of the required draughtsmen, and the co-operation of a number of well-known geographers has been secured; for it is recognized that much more is needed than the use of existing *cartographic* material. The duties of the geographers will include the selection of the names to be included; the consideration of the nomenclature of physical features, regions, peoples, etc.; the graduation of the names according to their importance; the orthography, and

so forth. It has been decided that inhabited centres shall be distinguished in three ways: the population by the town-sign, the political status by underlining, and the general importance by the type used. For the more detailed maps, of countries using the Roman script, the official spelling will be used, and the language of the country for generic terms; elsewhere the international usage for posts and telegraphs will be followed. This does not apply to the more general maps, which will be made specially serviceable to Italians by giving the names as known in Italy, with others in brackets. These maps may have to be translated in case of editions for foreign use. The size will be 40 × 50 cm., and the number of maps about 80, giving, by reason of the larger area used in each sheet, a total surface 25 per cent. greater than that of Stieler's 100 maps. For the greater part of Europe the scale will be 1/1½ M, with a liberal use of more detailed insets from 1/750,000 to 1/250,000, so that practically all the space on each sheet will be filled. The report includes a specimen map, of London and neighbourhood, showing the style adopted for thickly populated areas, in order to bring out both the physical and demographical character. The hydrography is shown in black, with a view to securing absolutely correct relation to the rest of the map, the relief by a fairly coarse hill-shading, and parks, woods, etc., by a light green stipple. Index references will be made by the help of a grid covering both the main map and insets and reducing the space to be searched over to one square centimetre. After much consideration it has been decided that photographic methods of reduction, etc., shall be used as little as possible, the compilation being on the scale of the finished map, which is to be engraved directly on stone.

The publishers hint at a possible issue of foreign editions for the special benefit of "nations less advanced cartographically (Spaniards, Portuguese, Anglo-Saxons)." To show the last what they can do, they have chosen for their specimen the map of London and its neighbourhood, on the scale 1/250,000, evidently compiled from the Ordnance Survey 1-inch map of 1908–9, but with improvement in the spelling, as Westham, Peter Sham, and Cristal Palace. Where they diverge from the well-known principles of the International Map, as in use of the black plate for rivers instead of a separate blue plate, their wisdom is doubtful. And may we suggest that they should, in acknowledging their sources of information, be careful to indicate the material which is derived from the work of the nations less advanced in cartography, that it may be viewed in its proper light?

Danish–Swedish Tropical Station in the Dutch East Indies.

We understand that an expedition lately left Copenhagen for the Dutch East Indies with the object of taking preliminary steps towards the establishment of a Tropical Station for biological research in that region. It is headed by Dr. T. Mortensen, of the Copenhagen Zoological Museum, and the botanist Hjalmar Jensen. The project was set on foot some years ago and has been brought to a head through the labours of a Scandinavian Society formed for the purpose. The present expedition has been rendered possible by a grant from the "Rask-Ørsted Fund." The probable site of the station will be in the Ké islands, previous research having shown that there is an unusual abundance of animal life in the waters to the west of the group. What is really a deep-water fauna is here found at comparatively small depths—200–300 metres—making it easy to collect rare deep-water species. It is possible that Dutch co-operation may be secured, and in any case the intention is to give an international character to the station.

OBITUARY

Alfred Grandidier.

THE veteran explorer of Madagascar, *doyen* of French geographers and Gold Medallist of this Society, died early in September last at Paris, having lived to almost complete his eighty-fifth year, and having achieved a world-wide reputation as the man above all others to whom our precise knowledge of the great African island has been due.

Born in Paris in 1836, Grandidier early devoted himself to scientific and geographical studies, and began his travels when little over twenty years old. It is not perhaps generally known that they had given him a more than cursory acquaintance with parts of two other continents before he finally settled down to the work in Madagascar with which his name will always be principally associated. After visits to the United States, Canada, and Cuba, he set out in the company of one of his teachers on an extensive journey in South America with a view to research in some of the least-known parts of the interior. The illness of and enforced abandonment of the undertaking by his companion soon left him to continue the journey alone; but during two years he covered much ground in Peru, Bolivia, the Argentine, and Brazil, in the last of which he paid a visit to the little-known tribe of the Botocudos. A project to trace to its unknown destination the great stream of the Madre-de-Dios was prevented by the sickness of a large part of his followers. Returning to Europe in 1860, he went to India in 1863 with the bold design of exploring the Tibetan plateau and studying its people. But his health gave way during preliminary studies in Southern India and Ceylon, and he sailed for Réunion to recruit, stopping for some time *en route* at Zanzibar and other parts of East Africa, where, as usual, he occupied himself with surveys and the formation of scientific collections.

Leaving Réunion in 1865 he spent some time on the east coast of Madagascar, and thus gained a first insight into the vast field for research of all kinds offered by the then for the most part unknown interior of the great island. Into this work he threw himself with untiring energy for the next five years—with one short visit to France to obtain support for his undertaking—traversing the greater part of the island from end to end. To describe the several journeys even in outline would occupy a good many pages. Unsuccessful ventures in the north-east were followed by a series of journeys in the south-western quarter of the island, then almost entirely unknown. Later Grandidier visited Majunga on the north-west coast, and made his way overland to the Hova capital, whence he carried out journeys of exploration in various directions, including one to the Alaotra lake, the largest in Madagascar. In November 1869 he left Tananarivo for Morondava on the west coast, crossing part of the Betsileo country. The next year he crossed its whole width, reaching its capital Fianarantsoa, and afterwards striking across the mountains to the east coast, and so for the second time completing the traverse of the island from west to east. After a journey along the east coast to Antongil Bay, he once more reached Tananarivo from Mahanoro, returning later by another route to Tamatave, and so finishing a series of journeys which had provided topographical and scientific material sufficient to revolutionize our knowledge of the general features of the island besides supplying the first precise basis for its cartography by careful astronomical observations.

From 1870 onwards Grandidier spent most of his time at home, working up the material collected with the help of various collaborators—among them his

son Guillaume, now secretary of the Paris Geographical Society, and himself a meritorious explorer of Madagascar. Publication was undertaken in an imposing series of volumes dealing with every aspect of the geography, history, ethnology, and natural history of the island. Such an undertaking was naturally the work of years, and though a number of volumes have seen the light, the whole programme has not yet, we believe, been completed. Grandidier was also the author of many papers in scientific journals, and took a foremost part in superintending the publication of the extensive series of reprints of old works on Madagascar, one of which was reviewed in the December number of the *Journal* (p. 459).

Grandidier received the Founder's Medal of the Society in 1906, having been Hon. Corresponding Member since 1903.

Manuel Vicente Ballivian.

We regret to have to record the death, which took place at La Paz on 7 September 1921, of our Hon. Corresponding Member, Señor Don Manuel Vicente Ballivian, long known as one of the most assiduous exponents and supporters of geography in the republic of Bolivia. To him was mainly due the foundation in 1889 of the Sociedad Geográfica de la Paz, which has done so much to foster an interest in geography in Bolivia, and whose Journal has been enriched by many of his contributions. In his official position as Ministro de Colonias y Agricultura, Señor Ballivian did much to promote researches into and development of the natural resources of his country, and he also did good service in familiarizing his countrymen with the work of foreign geographers, especially in South America. Most of his publications had to do with one or other of these subjects, or with the ethnology and archæology of Bolivia, in which he took a keen interest. He was always ready to communicate to this Society the results of geographical work in Bolivia, and its library has benefited by gifts of his own and other publications relating to that country. His work had been recognized by the award to him of the medals of various public bodies (including the Madrid Geographical Society), and he was Honorary Corresponding Member of about a dozen Geographical Societies in Europe, Asia, and America.

René Chudeau.

We see with regret the announcement, in *La Géographie* for September–October 1921, of the death of the well-known geologist and explorer René Chudeau, to whom perhaps, as much as to any one man, we owe the most valuable additions to our knowledge of the French territories of the Sahara and Western Sudan within the past two decades. He afforded the rare instance of a man who took up the work of an explorer at a relatively late age, being already forty when he began his African work as the colleague of Prof. E. F. Gautier (who writes his obituary in *La Géographie*) in the trans-Saharan expedition of 1904–06: he had previously engaged in University work for some years. After doing good work with the Niéger Mission for the study of a railway route across the Sahara, he was associated (as geologist) with M. Gruvel in the study of the rich fishing-grounds off the coast north of the Senegal. Becoming geologist to the Government of French West Africa, he made good use of his opportunities of adding to our knowledge of the geology and geography of that extensive region, on which his contributions to scientific journals are to be numbered by the dozen. His longer works were (1) The 'Sahara Soudanais,' constituting his share in the results of the expedition carried out in conjunction with M. Gautier; (2) his part in the work in two

volumes published jointly with M. Gruvel entitled 'A travers la Mauritanie occidentale.' M. Gautier describes him as a true explorer, vigorous and hardy—"a savant who lived in his laboratory, only this laboratory was the Sahara and the Sudan."

Wilhelm Sievers.

The well-known German geographer Prof. W. Sievers died last year at the age of sixty-one. Born in Hamburg in 1860, he studied geography under Richthofen and Wagner and became favourably known to geographers through his journeys of exploration in Venezuela and Colombia in 1884–86 and again in 1892–93, the first being carried out with the help of a grant of the Karl-Ritter Stiftung and under the auspices of the Berlin Geographical Society. The result was to make him a foremost authority on that part of South America, on which he wrote various treatises, the most important being an account of his second journey to Venezuela, forming vol. 12 of the *Mitteilungen* of the Hamburg Geographical Society. Sievers became Professor of Geography at Giessen, and the greater part of his later life was devoted to University work, though he made an expedition to the headwaters of the Amazon in 1909. He was a copious writer on geographical subjects, more especially on those connected with South America, and was also known for his series of geographical descriptions of the several continents, planned on somewhat the same lines as 'Stanford's Compendium' in this country.

MEETINGS: ROYAL GEOGRAPHICAL SOCIETY: SESSION 1921–1922

First Evening Meeting, 7 November 1921.—The President in the Chair.

PAPER: The Aures Massif, Algeria. M. W. Hilton-Simpson.

Second Evening Meeting, 21 November 1921.—The President in the Chair.

ELECTIONS.—Frederick Edward Fox Adam; Hon. Mrs. H. Adeane; Major B. E. Anderson, D.S.O.; William Anderson, M.A.; Ian Graham Andrew; Weld Arnold; Rev. J. W. Arthur, O.B.E., M.D.; Charles Watson Bailey, J.P.; Captain Walter Richard Barker; Henry Dupré Malkin Barton; Edward Percival Bayliss; Gavin de Beer, B.A.; Capt. Frederick Charles Bishop; A. H. Blake, M.A.; Captain A. J. Brace; David William Brisbane, A.M.INST.C.E.; Lieut. Gordon D. Brown, R.N.R.; Brig.-Gen. W. Nevile Campbell, C.S.I., C.M.G., D.S.O.; Austin J. Clements; George Cuthbert Henry Coleman; Barry Keyte Tenison Collins; Miss Elsie Kathleen Cook; Colonel St. John Cooke, D.S.O.; Archibald Samuel Cooper, C.B., C.M.G.; George Edwin Cormack; Cyril Lockhart Cottle; Captain John Coupland; Mrs. George Cran; Captain Walter Fergusson Crawford; Captain George Darby; Satyendra Mohan Dhar; Mrs. E. Harriman Dickinson; Bernard Dudley Frank Docker; Edwin T. Dottridge, C.B.E.; Sidney John Downham; Sebert Gaunton Dyer, B.SC.; Rev. Francis John Edmond, M.A.; Henry Eggleston, M.B., B.S.; D. Tudor Evans; Victor Lionel Affleck Fairley; Commr. Donald W. Farmer; D. C. Hemphrey Fenn; Lieut. R. G. Fowle, R.N.; Hon. Essex French, O.B.E.; Walter Hugh Frizell, M.A., J.P.; H. G. Garrett; Henry V. Gay, B.SC.; Captain Edward Aubrey Glennie, D.S.O., R.E.; Frederick J. Othello Golding; Lieut. George Donald Gould; William Robert Gourlay, C.S.I., C.I.E.; Lieut. John Fergus Clifton Graham; Charles F. Gray, A.I.E.E., A.M.I.E.E.; Major Frederick Green, M.C., R.A.M.C.; John Wilberforce Green; A. Stanley Greenland, J.P.; Allan Woodforde Ball Hamilton; Sydney George Steels Hare; William Harding; Edward Allison Haynes; Alfred Hewitt;

Prof. Edward Hindle, M.A., PH.D.; Henry Jacques Holman; Captain Stuart Clifford Hooper; William Horsfield, B.A.; Henry William Howes, B.A.; Rev. William Remfry Hunt; Victor de la M. Hurst; Stanley William Hymans; Sir Samuel Instone; Claud R. Winkworth Jenkins; Kenneth Edgar Clayton-Kennedy; William James R. Kennedy, M.A.; Geoffrey Laws; Major Forbes Leith; Arthur Stanway Le Mare; Major Clinton Gresham Lewis, R.E.; Lieut.-Colonel J. E. Lewis, D.S.O.; Thomas Henry Lewis, M.B.E.; Herbert Lissak, M.C.; John Lionel Bretherton Llywelyn-Llewellin; Captain C. B. Lyon; Victor L. Mabb; Prof. Louise McIlroy, M.D., D.SC.; Captain H. Manley; Isaac Mason; Captain Leslie Gard Matthews; Major W. H. Miller, O.B.E.; David Millington, O.B.E.; Lieut. H. W. Mirehouse, M.B.E.; Rev. George Herbert Mitchell; Bernard Moiser, M.D.; Francis Jennings Molloy; James Edmondson Monk; S. M. Murray; James Lawrence Chaworth-Musters; Joseph Myers; Clement Thompson Nash; Arthur Boughton Neal, B.A.; Roger Edward Norton; Captain Edward Henry Banks Palmer, O.B.E.; Miss Florence Tyzack Parbury; Cyril George Pearce; Joseph Edwin Pedelty; Edgar Frank Phillips; Eric O. Pockley, M.B.; Cyril Potter; Major R. T. K. Potter, I.A.; Archibald Grenfell Price: Stanley Lewis Price; Cornwallis St. Aubyn Ratcliffe, M.A.; Lieut.-Commr. Geoffrey Rawson, O.B.E., R.I.M.; Miss L. C. Read; Geoffrey B. Smith-Rewse; Mrs. Elsie Constance Rhodes; Mrs. Eleanor Elkins Rice; Lieut. A. J. Roberts; Leslie Maurice Rota; Captain P. W. Rutherford, M.C.; Robert Rycroft; G. R. Sandford; Miss Gundred Helen L. Savory, B.A.; Mrs. Amelia Scott; John Croll Scott; Jitendra Mohan Sen, B.SC.; Miss Edith Mary Shaw; Captain George Simpson; Charles Sebastian Somers-Cocks, C.M.G.; Miss Gertrude May Sopwith; Captain St. John Robert Eyre Smith, M.C.; Victor Clarence Spary, B.SC.; Miss E. M. Stear; Lieut. Robert Spears Stobo, R.A.N.R.; C. A. Stocken; Lieut. Thomas Pleadwell Cyril Stuttaford; Cuthbert Archibald Sutcliffe, B.A.; Theodore Lynam Thomas; Thomas Torrance; Philippe Troeder; George Twigg; John Henry Vanstone; Lieut.-Colonel Edward Charles Lloyd Wallace, D.S.O., I.A.; Albert Whitham; Benjamin Thomas Williams; Mrs. Florence K. Wilson; Charles Wolfendale; Miss Dorothy M. Woodhead, B.A.; James Mann Wordie, M.A.; George Wrangham-Hardy.

PAPER: Jan Mayen: An Old Arctic Volcano. J. M. Wordie.

Third Evening Meeting, 5 December 1921.—The President in the Chair.

ELECTIONS.—Miss Joséphine de G. Addison; Major Charles Frederick Ball; Mrs. J. W. Burrows; Captain Lord Arthur Butler; Captain Louis Castellain; Miss Dora Thornton Clarke; Mrs. Dorothy E. Cowell; John Cumming; Miss Louise Gerard; Lewis Boswell Inman Hamilton; Lieut.-Colonel Ernest Hely; Captain Thomas W. H. Hosegood; Eric H. Campbell Layman; Frederick H. Lee, M.A.; Ernest Alfred Nolan; Lieut.-Colonel Richard Herbert Rowe, D.S.O., M.C., R.A.; Miss Edith E. Granville Smith; Herbert Joseph Spinden, PH.D.; Robert Whitfield Stanners, M.A.; Leonard Sydney Suggate; Augustus S. Taylor; Captain John Ithel Phillips Thomas; Miss Theodora C. Trench; Francis Dashwood Watson.

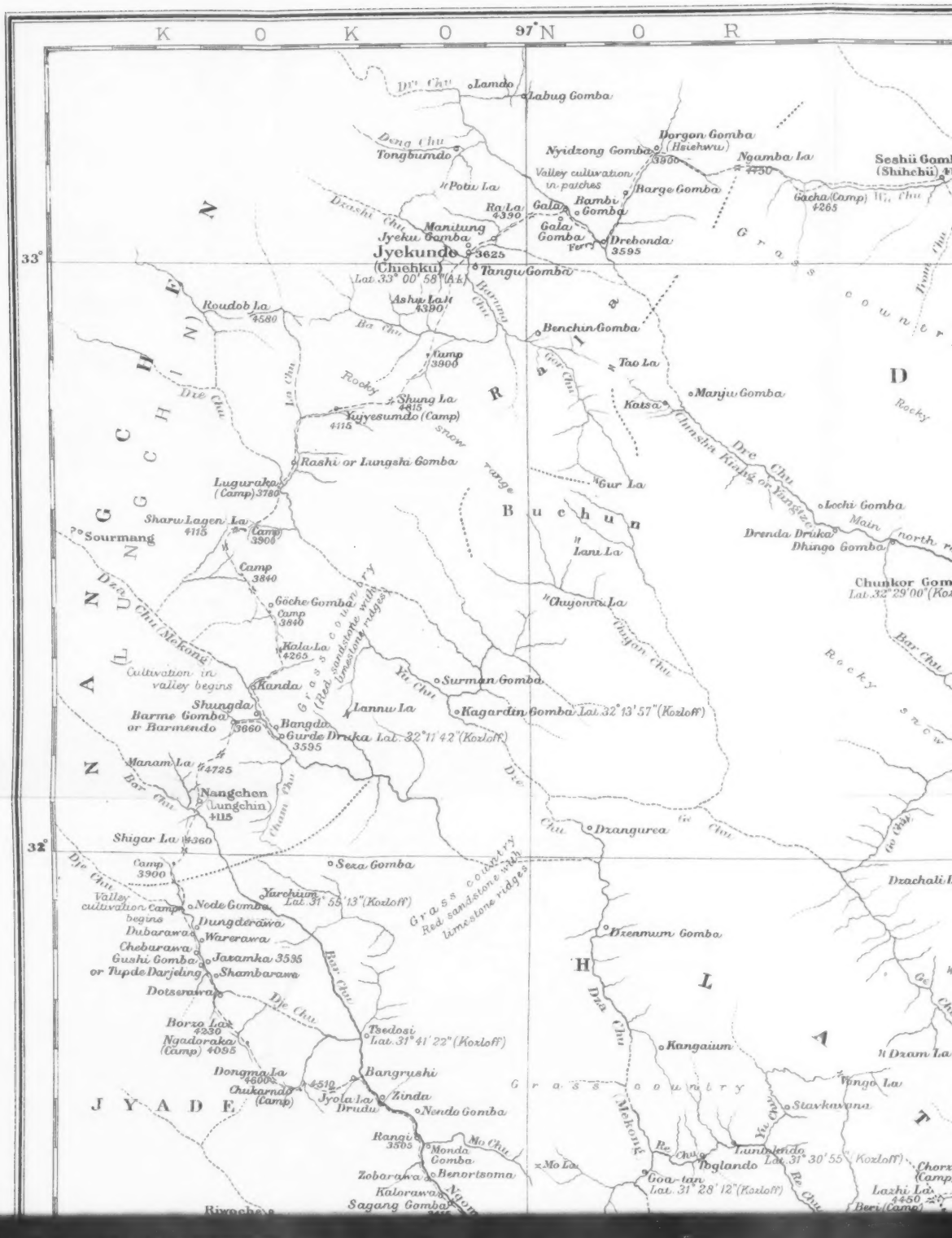
PAPER: A Recent Journey in Northern Labrador. G. M. Gathorne-Hardy.

First Afternoon Meeting, 14 November 1921.—The President in the Chair.

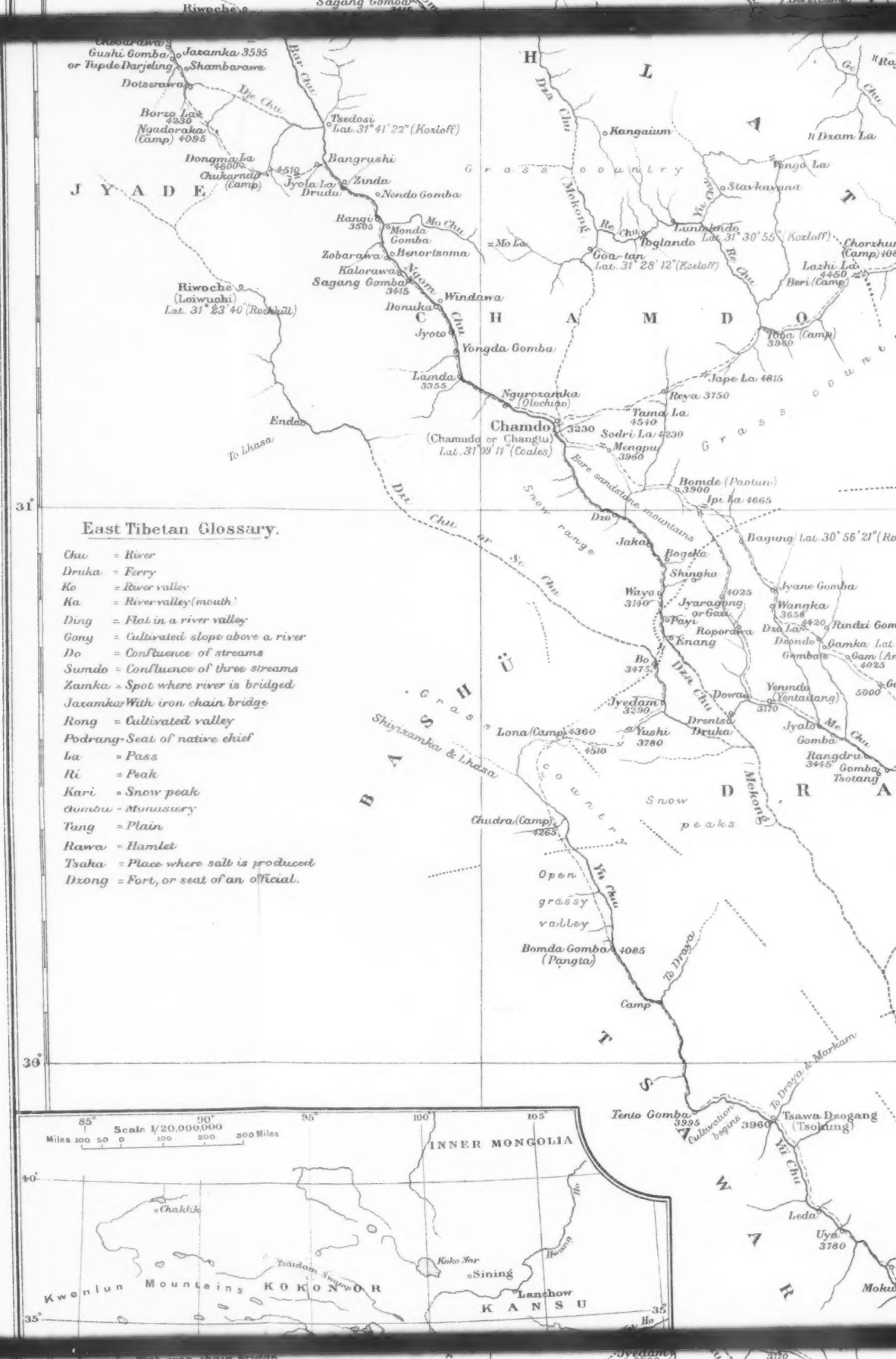
PAPER: The Physiography of Sierra Leone. F. Dixey.

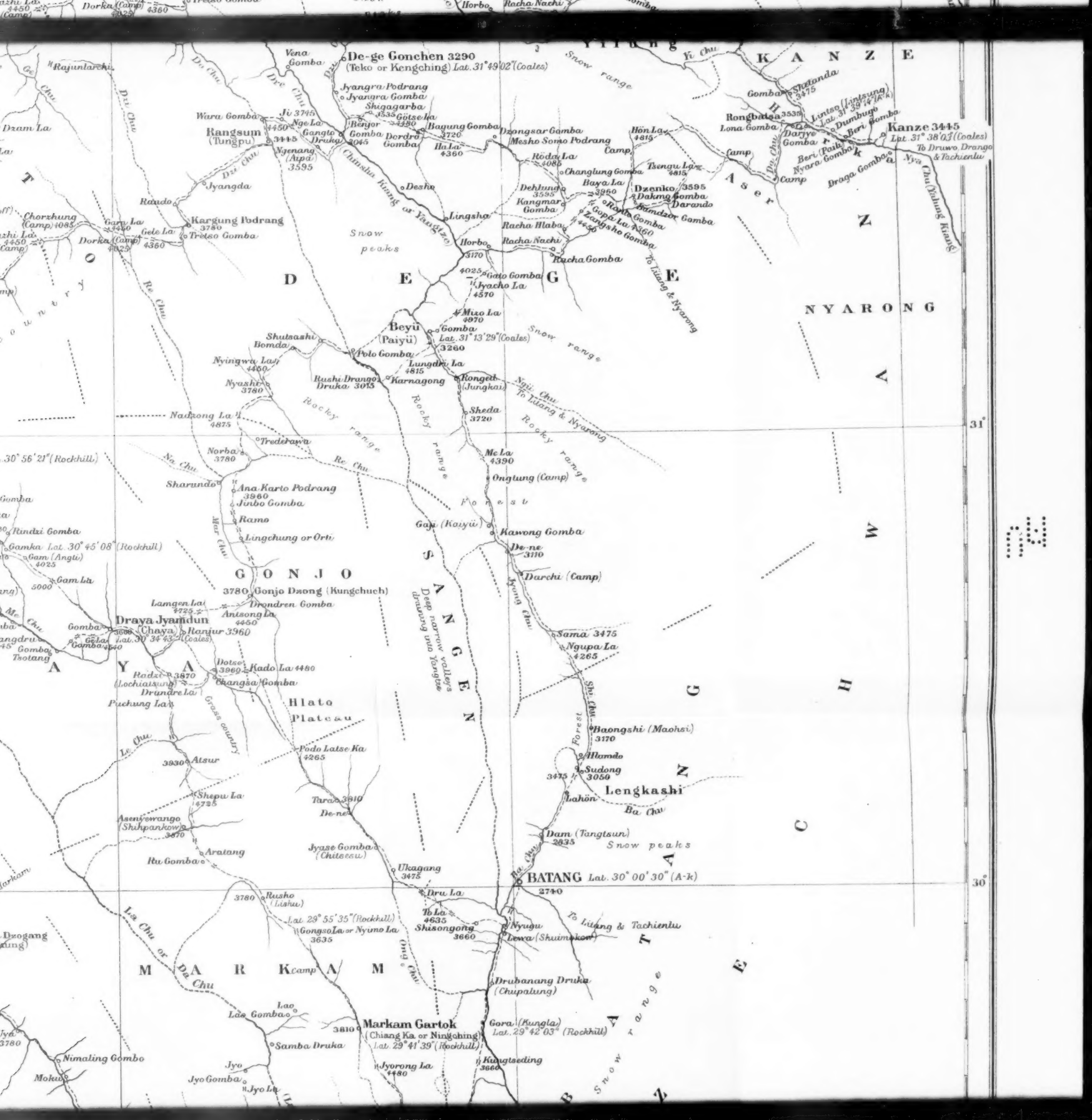
Second Afternoon Meeting, 12 December 1921.—The President in the Chair.

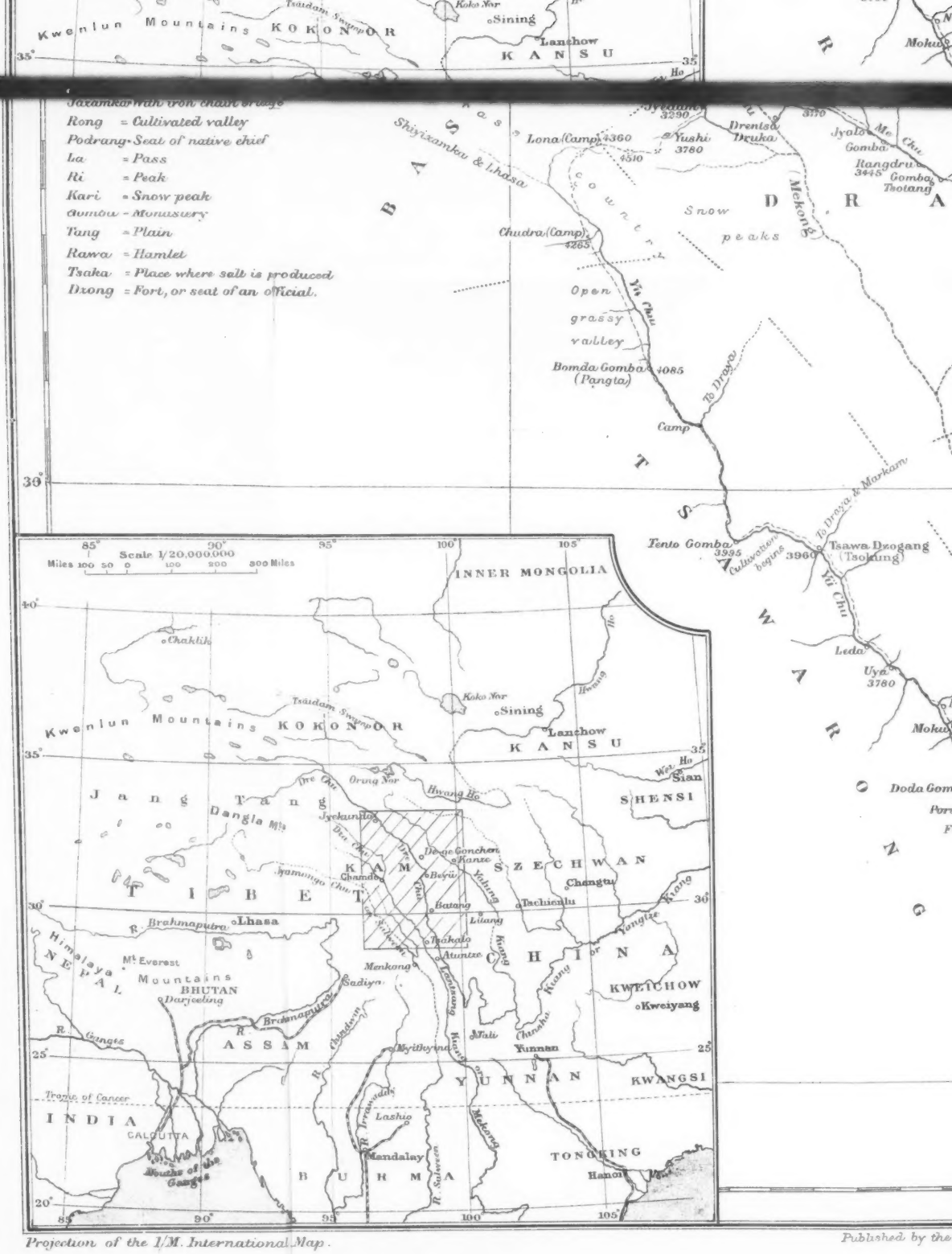
PAPER: Photographic Equipment and Methods for Travellers. Captain J. B. L. Noel.


K O K O N O R
97°
33°
32°
Lamdo
Labug Gomba
Tongbumdo
Dorgon Gomba (Hsiehwu)
Nyidzong Gomba 3900
Ngamba La 4450
Valley cultivation in patches
Harge Gomba
Gacha (Camp) 4265
Potu La
Ra La 4390
Gala
Rambi Gomba
Manitung
Jyeku Gomba
Jyekundo 3625
(Chiehku)
Lat. 33° 00' 58" (Alt.)
Gala Gomba
Ferry
Drehonda 3595
Tangu Gomba
Roudob La 4580
Ashu La 4390
Benchun Gomba
Camp 3900
Tao La
Manju Gomba
Shung La 4815
Yuyesumdo (Camp) 4115
Kaisa
Rashi or Lungska Gomba
Lugurako (Camp) 3780
Gur La
Lochi Gomba
Sharu Lagen La 4115
Sourmang
Camp 3900
Drenda Druka
Dhingo Gomba
Lani La
Camp 3840
Chunkor Gom
Lat. 32° 29' 00" (Ko
Göche Gomba
Camp 3840
Chayonma La
Kala La 4265
Cultivation in valley begins
Kanda
Surman Gomba
Shungda
Barme Gomba or Barmendo 3660
Bangda
Gurde Druka 3595
Lat. 32° 11' 42" (Kozloff)
Lannu La
Kagardin Gomba
Lat. 32° 13' 57" (Kozloff)
Manam La 4725
Nangchen (Jungchun) 4115
Shigar La 4360
Dzrangurea
Camp 3900
Sexa Gomba
Drachali
Valley cultivation Camp begins
Node Gomba
Yarchiung
Lat. 31° 55' 13" (Kozloff)
Dzeanmum Gomba
Dungderawa
Dubarawa
Warerawa
Chebarawa
Gushi Gomba or Tupde Darjeling
Jazamka 3595
Shambarawa
Dotserawa
Borzo La 4230
Ngadoraka (Camp) 4095
Tsedosi
Lat. 31° 41' 22" (Kozloff)
Kangaium
Dzam La
Dongma La 4600
Chukarnda (Camp)
Bangrushi
4510
Jyola La
Zinda
Drudu
Nendo Gomba
Tongo La
Stavkawana
Ranai 3595
Monda Comba
Mo La
Tunbolando
Lat. 31° 30' 55" (Kozloff)
Zobarawa
Benortsoma
Toglando
Kalorawa
Goa-tan
Lat. 31° 28' 12" (Kozloff)
Lazhi La 4450
Sagang Gomba
Beri (Camp)
Riwoche
Grass country
Red sandstone with limestone ridges
Snow range
Rocky
Main north r
Bar Chu
Dze Chu (Mekong)
Dje Chu
Yu Chu
Ge Chu
Drachali
Dzachu
Mo Chu
Re Chu
Tsum Chu
Ba Chu
Jya Chu
Dru Chu
Deng Chu
Drashi Chu
Dzachu
Yangtze
Kinshi Kiang or
Dre Chu
Dzachu
Dzachu
Dzach

98°
99°
100°
33°
32°
PART OF KAM
in
EASTERN TIBET
by
ERIC TEICHMAN, C.I.E., B.A.
Scale 1/1,000,000 or 1 Inch = 15·78 Stat. Miles.
Miles 10 5 0 10 20 30 40 Miles
1 Millimetre = 1 Kilometre
Kilometres 10 5 0 10 20 30 40 50 60 Kilometres
Reference
Routes followed by Mr Teichman ——— Pass ×
Boundaries of states and provinces shown thus .....
Names are all given in Tibetan, with Chinese names where the latter are in common use, added in brackets.
Tibetan romanisation: vowels as in Italian and consonants as in English, with j substituted for soft g.
Chinese romanisation according to Chinese Postal System.
Tzachuka
D E — G E
Lintsung
Dungko
Tzako
Yilung
KANZE
Rangsum (Tungpu)
Kanze 3445
Lat. 31° 38' 03" (Coales)
De-ge Gonchen 3290
(Teko or Kengching) Lat. 31° 49' 02" (Coales)
Seshü Gomba (Shihchü) 4115
Lamtunch La
Yuchundo
Lat. 33° 2' 16" (Kozloff)
Jü Gomba 4115
To Tzako
Ombu Gomba
Camp 4540
Dzu La 4815
Camp 4115
Dröma Hlakang (Tengko) 3415
Gupa Gomba
Tsatsa Gomba
Gen La
Nali-sun La
Nojelung Gomba 3900
Göze Gomba (Lintsung) 3750
Jyachi Gomba
Dzungo Gomba
Senke La
Camp
Latse kare La 4300
Nando 3780
Sheche Gomba
Rungu Gomba
Meji Gomba
Hönda Druka 3660
Bome Gomba
Denchin Gomba
Dema Podrang
Golalarchi
Dzogchen Gomba (Chuching) 4055
Muri La
Trötsang Podrang 3585
Bana-jun Lat. 31° 59' 55" (Koz.)
Dadza Gomba
Dzachali La
Kolando
Gengia Gomba
Tro La
Jargo Gomba
Sangdru Gomba
Deji Podrang
Yilung Lat. 31° 53' 20" (Coales)
Jangu Gomba
Rajunlarchi
Vena Gomba
Jyangra Podrang
Jyangra Gomba
Shigagarba 3535
Wara Gomba
Ju 3745
Nge La 4450
Gangtu Gomba 4045
Dordra Gomba
Götse La 3390
Bagung Gomba 3720
Dzongsar Gomba
Mesho Somo Podrang
Hön La 4815
Camp
Röda La 4085
Changlung Gomba
Tsengu La 4815
Camp
Shatanda 3475
Rongbatsa 3530
Lona Gomba
Lintse (Lintsung) Lat. 31° 39' 14" (Coales)
Dumbugo
Darjye Gomba
Beri Gomba
Beri (Paila) Nyara Gomba
Draga Gomba
To Druwo Drango & Tachienlu
Nya Chu (Yalung Kiang)
Dram La
Jyangda
Raado
Desho
Lingsha
Dehlung 3535
Kangmar Gomba
Baya La 3960
Dzenko 3585
Dakma Gomba
Darando
Ramdzor Gomba
Racha Hlaba
Racha Nachi
Gupa La 4450
Zangsho Gomba 3960
Chorzhung (Camp) 4085
Gara La 4450
Gele La 4360
Lazhi La 4450
Dorka (Camp) 4025
Kargung Podrang 3780
Treteo Gomba
Horbo
Snow range
Grass country
Yalung Kiang
Yangtze
Yu Chu
Dza Chu
Chumsha Kiang
Ma Chu
Ba Chu
Ge Chu
Gew Chu
Den Chu
Ong Chu
Re Chu
Tza Chu
Marmu Chu
Trung Chu
Wang Chu
Rocky snow range
Golalarchi snow range
Main north road


Gushi Gomba or Tupde Darjeling
Jazamka 3595
Shambarawa
Dotserawa
Borzo La 4230
Ngadoraka (Camp) 4095
Dongma La 4600
Chukarndo (Camp)
4510
Jyola La
Drudu
Tsedosi Lat. 31° 41' 22" (Kozloff)
Bangrushi
Zinda
Nendo Gomba
Rangi 3505
Monda Gomba
Zobarawa
Benortsoma
Kalorawa
Sagang Gomba 3415
Riwoche (Leiwuchi) Lat. 31° 23' 40" (Rockhill)
Windawa
Donuka
Jyoto
Yongda Gomba
Lamda 3355
Endoo
To Lhasa
Ngurozamka (Olochuo)
Chamdo 3230
(Chamudo or Changtu) Lat. 31° 09' 11" (Coales)
Mo La
Mo Chu
Mekong
Re Chu
Kangaium
Dzra Chu
Goa-tan Lat. 31° 28' 12" (Kozloff)
Taubando Lat. 31° 30' 55" (Kozloff)
Toglando
Stavkavana
Yango La
Dzam La
Lazhi La 4450
Beri (Camp)
Chorzhun (Camp) 40
Toba (Camp) 3950
Jape La 4815
Reya 3750
Tama La 4540
Sodri La 4230
Mengpu 3960
Bomde (Pastun) 3900
Ipu La 4665
Bare sandstone mountains
Snow range
Dzu Chu or Se Chu
Dzo
Jakar
Bogella
Shingka
Wayo 3140
Jyaragong or Gaza
Payi
Roporawa
Enang
Bo 3475
Jyedam 3290
Lona Camp 4360
4510
Yushi 3780
Drentse Druka
Dowa
Yenmda (Yentailang) 3170
5000
Jyala
Gomba
Rangdru 3445
Gomba
Tsotang
Bagung Lat. 30° 56' 21" (Ro
Jyane Gomba
Wangka 3658
Dza La 4420
Rindzi Gom
Dzondo
Gamka Lat
Gombata
Gam (Ar 4025
Shuyzamka & Lhasa
Chudra (Camp) 4265
Open grassy valley
Bomda Gomba 4085 (Pangta)
To Dzoya
Camp
Yu Chu
Tenlo Gomba 3395
Cultivation begins
3960
Tsawa Dzogang (Tsoding)
To Dzoya & Markam
Leda
Uya 3780
Moku
Grass country
Snow peaks
Grass country
Grass country
Grass country


De-ge Gonchen 3290
(Teko or Kengching) Lat. 31°49'02" (Coales)
Vena Gomba
Rangsum (Tungpu) 3445
Wara Gomba
Ngenang (Aipa) 3595
Jyangra Podrang
Jyangra Gomba
Shigagarba 4335
Gotse La 4380
Benjor Gomba 3045
Dordra Gomba
Bagung Gomba 3720
Ila La 4360
Dzongsar Gamba
Mesho Somo Podrang
Roda La 4085
Changlung Gomba
Deshe
Dehlung 3595
Kangmar Gomba
Lingsha
Racha Hlaba
Racha Nachu
Racha Gomba
Horbo 3170
Gato Gomba 4025
Jyacho La 4570
Hon La 4815
Camp
Tsengu La 4815
Dzenko 3595
Dakma Gomba
Darando
Ramdzor Gamba
Gopki La 4460
Zangsho Gomba
Baya La 3960
Camp
Rongbatsa 3538
Lona Gomba
Darjye Gomba
Lintso (Jintsung) Lat. 31°39'14" (A-k)
Dumbuga
Beri Gomba
Kanze 3445
Lat. 31°38'03" (Coales)
To Druwo Drango & Tachienlu
Beri (Paiba)
Nyara Gomba
Draga Gomba
Nya Chu (Yalung Kiang)
Shetanda 3475
Gomba
Yi Chu
Snow range
KANZE
NYARONG
Dzi Chu
Dre Chu
Ge Chu
Rajunlarchi
Dram La
Jyangda
Rando
Kargung Podrang 3780
Tretso Gomba
Chorzhung (Camp) 4085
Gara La 4450
Gele La 4360
Dorka (Camp) 4025
Snow peaks
Chumsha Kiang or Yangtze
To Litang & Nyarong
Beyu (Paiyu) 3260
Lat. 31°13'29" (Coales)
Mizo La 4970
Gomba
Shutsashi Bomda
Polo Gomba
Lungdra La 4815
Karnagong
Rongeh (Jungkai)
Rushi Drango Druka 3013
Nyashe 3780
Nyingwa La 4460
Sheda 3720
Rocky range
Ngti Chu
Nadzong La 4875
Tredenawa
Norba 3780
Re Chu
Na Chu
Sharundo
Ana Karlo Podrang 3960
Jinbo Gomba
Ramo
Lingchung or Orti
Mar Chu
Gamka Lat. 30°45'08" (Rockhill)
Gam (Angu) 4025
Gam La 5000
Rindzi Gomba
Me Chu
Mc La 4390
Ongtung (Camp)
Forest
Gaju (Kaiyu)
Kawong Gomba
De-ne 3110
Darchi (Camp)
Jyong Chu
Sama 3475
Ngupa La 4265
Shi Chu
Baongshi (Maohsi) 3170
Hlamdo
Sudong 3050
Lengkashi
Lahön
Ba Chu
Dam (Tangtsun) 2835
Snow peaks
BATANG Lat. 30°00'30" (A-k) 2740
To Litang & Tachienlu
Nyugu
Lewa (Shuimakow)
Drubanang Druka (Chupalung)
Gora (Kungla)
Lat. 29°42'03" (Rockhill)
Kungtseding 3660
Jyorong La 4480
Markam Gartok (Chiang Ka or Ningching)
Lat. 29°41'39" (Rockhill)
3810
Lao
Las Gomba
Samba Druka
Nimaling Gombo
Jyo
Jyo Gomba
Jyo La
Mokuk
Lia Chu or Da Chu
Ong Chu
Snow range
Gonjo Dzong (Kungchuch)
3780
Drondren Gomba
Draya Jyamdun (Chaya) 3668
Lat. 30°34'43" (Coales)
Ranjur 3960
Lamgen La 4725
Antsong La 4450
Gomba
Gela
Gamba 4560
Tsotang
Dotse 3960
Kado La 4480
Radzi 3670
(Lochiaisung)
Changsa Gomba
Drundre La
Puchung La
Hlato Plateau
Grass country
Podo Latse Ka 4265
Atsur
3830
Shepu La 4735
Asenyewango (Shihpankow) 3670
Aratang
Jyase Gomba (Chitsesu)
Ua Gomba
Ukagang 3475
Dru La
Tura 3810
De-ne
Rusho (Lishu) 3780
Lat. 29°55'35" (Rockhill)
Gongso La or Nyuno La 3635
To La 4635
Shisongong 3660
Deep narrow valleys draining into Yangtze
Forest
Snow range
Snow peaks
Rocky range
Dzogang
MARKAM
GONJO
DEGE
YARGEN
CHAGCHEN
BAYAN
Camp
Yi Chu
Ba Chu
Ong Chu
Ua Chu
Re Chu
Dzi Chu
Dre Chu
Ge Chu
Mar Chu
Na Chu
Me Chu
Lia Chu
Shi Chu
Jyong Chu
Ngti Chu
30°56'21" (Rockhill)
31°
30°



Projection of the I/M. International Map.

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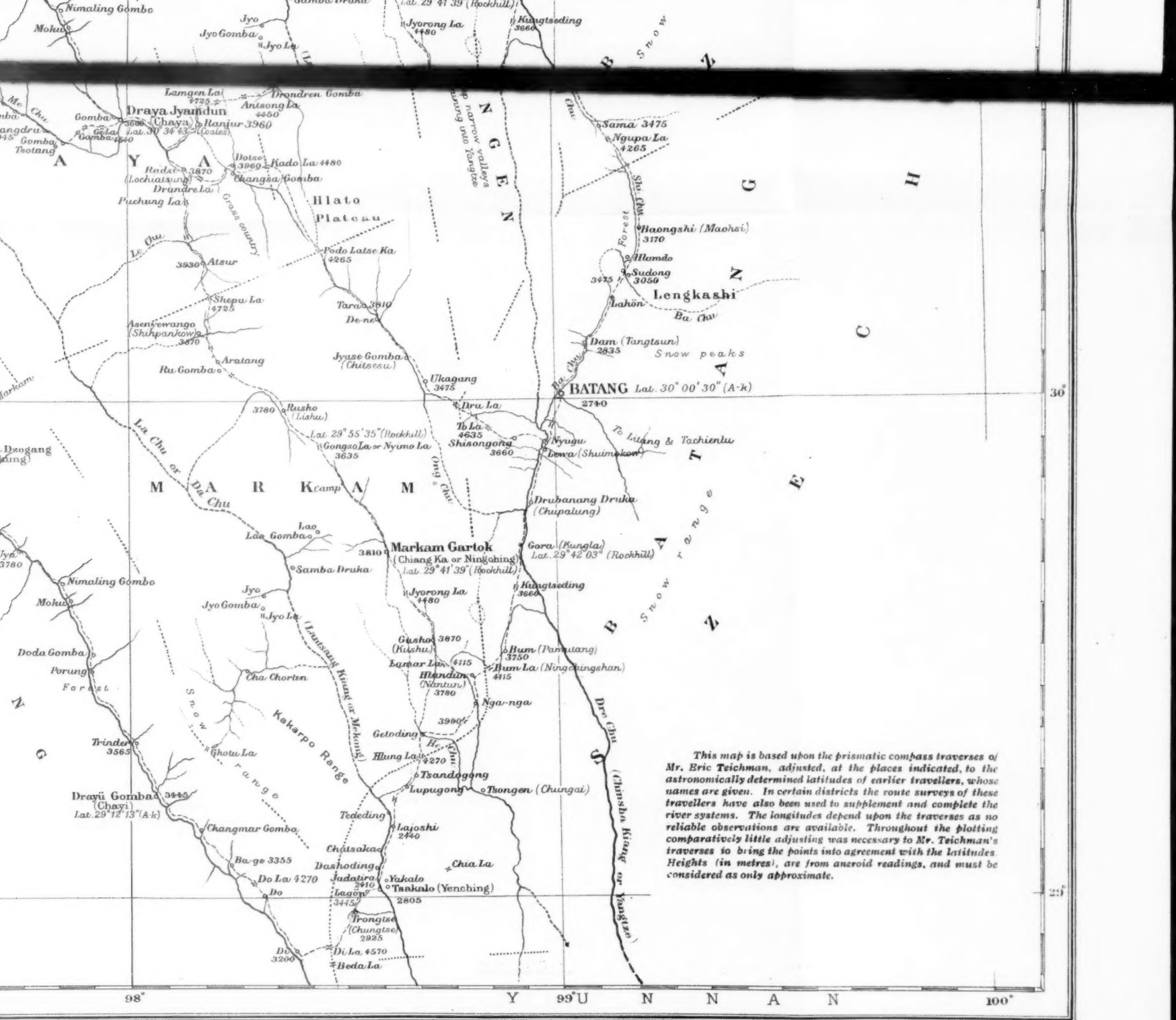

This map is based upon the prismatic compass traverses of Mr. Eric Teichman, adjusted, at the places indicated, to the astronomically determined latitudes of earlier travellers, whose names are given. In certain districts the route surveys of these travellers have also been used to supplement and complete the river systems. The longitudes depend upon the traverses as no reliable observations are available. Throughout the plotting comparatively little adjusting was necessary to Mr. Teichman's traverses to bring the points into agreement with the latitudes. Heights (in metres), are from aneroid readings, and must be considered as only approximate.

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EASTERN TIBET.
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